

ERIC Document Resume		See Instruction Sheet		DATE OF RESUME		DATE RECEIVED													
A. PUBLICATION DATA																			
1. ERIC NUMBER ED001913		2. ORIGINATOR CONTROL NO(S). N.A.		3. IDENTIFICATION NO. N.A.		DO NOT WRITE IN SPACE BELOW													
4. AUTHOR(S): Board of Education of the City of Chicago						MICROFILM COPY AVAILABLE YES ☒ NO ☐													
5. TITLE OF DOCUMENT ABSTRACTED: Basic Mathematics I for the Secondary Schools						COPYRIGHT GRANTED YES ☒ NO ☐													
6. PUBLICATION TITLE: N.A.						COPYRIGHT RELEASE FILED YES ☒ NO ☐													
7. EDITOR(S): N.A.				8. PLACE OF ORIGIN Board of Education of the City of Chicago, Illinois CITY, STATE TELE. EXT. INST/LOC CODE		TYPE OF REPORT PROPOSAL ☐ IN-PROGRESS ☐ FINAL ☒ FOLLOW-UP ☐													
9. PUBLISHER OR SOURCE The Board of Education of the City of Chicago, Chicago, Illinois						OTHER ERIC REFERENCES:													
10. VOL. N.A.	11. PAGES N.A.	12. MO./YR. 1961	13. TOTAL PP. 157			ERIC SATELLITE CODE													
B. INDEXING DATA																			
14. SUBJECT AREA				15. TYPE OF ENDEAVOR Curriculum Guide															
16. INDEXING TERMS (8-12)		<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td>mathematical concepts</td> <td>slow learners</td> <td>Chicago, Illinois</td> </tr> <tr> <td>basic mathematics</td> <td>arithmetic deficiencies</td> <td>basic skills</td> </tr> <tr> <td>low achievement</td> <td>fundamental concepts</td> <td>senior high</td> </tr> <tr> <td>secondary education</td> <td>low achievers</td> <td>low ability</td> </tr> </table>						mathematical concepts	slow learners	Chicago, Illinois	basic mathematics	arithmetic deficiencies	basic skills	low achievement	fundamental concepts	senior high	secondary education	low achievers	low ability
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17. ABSTRACT (MAX. 250 WORDS)																			
The course is geared to meet the needs of students entering senior high school with a mathematics achievement level below sixth grade. Since two principal causes of serious deficiencies in arithmetic are a lack of understanding of the decimal system of notation and a lack of knowledge of the basic fundamentals of arithmetic, basic concepts must be re-taught. The course is divided into two semesters and contains five units—the number system and the addition, subtraction, multiplication, and division of whole numbers. Emphasis on comprehension is given by the inclusion of thought problems, involving pertinent experiences and high interest reading level. The ultimate objective is student achievement at a sixth grade level, to be accomplished through the development of a mastery of basic number facts and a realization of their importance in life situations; a striving for good work habits, accuracy, and speed; the increase abilities to estimate an answer and to use appropriate mathematical equipment; and the gain of sufficient understanding and competency to profit from instruction in Essential Mathematics. Small classes, attractive classrooms, adequate materials and texts, interested and skilled teachers, and the use of many sensory and manipulative devices should motivate slow learners to raise their achievement levels.																			
ERIC No.	18. SOURCE OF ABSTRACT																		
	C. FUNDING DATA																		
	19. SUPPORTING ORGANIZATION			20. DIVISION OR DEPT.		21. CONTRACT NO.													
				22. TOTAL COST OF PROJECT		PROJECT NO.													
			23. DURATION OR PROJECT		U.S. Department of Health, Education, and Welfare Office of Education														

75 D. 841 Ks

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ED001913

BASIC MATHEMATICS I

FOR THE
SECONDARY SCHOOLS

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BOARD OF EDUCATION
of the
CITY OF CHICAGO

INTERPOLATION

DEPARTMENT OF INSTRUCTION

BASIC MATHEMATICS I

DEPARTMENT OF CURRICULUM DEVELOPMENT

FOR THE

SECONDARY SCHOOLS

SECONDARY SCHOOLS

BENJAMIN C. WILLIS

General Superintendent of Schools

General Superintendent of Schools

BENJAMIN C. WILLIS

General Superintendent of Schools

Copyright 1961
Board of Education
of the
City of Chicago
Chicago, Illinois
Second Printing 1963
Third Printing 1964

Educational Materials Laboratory
Office of Education
MAY 1965
DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE

ACKNOWLEDGMENT

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Policy decisions regarding the content and placement of materials were recommended by the committee. Special credit for preparing this tentative program in basic mathematics is due to Mr. Charles T. McCarthy, Mathematics Department, Hyde Park High School.

During the past half century the per cent of boys and girls of high school age who have entered high school has tremendously increased. This has resulted in necessary curriculum changes from time to time to provide for wider ranges in abilities, needs, and interests of students at the high school level.

To meet the needs of the changing high school population, a number of changes have been made over the years. For example, a four-semester course in essential mathematics was developed about twenty years ago for students who were not planning to enter college and who needed more training in mathematics to meet the problems of daily living. This course was prepared primarily for students who entered high school with sixth- and seventh-grade achievement in arithmetic.

As the per cent of the 14 to 17 year age group that enters high school approaches the 100% mark, the range in abilities of students is so wide that some students now enter high school with such serious deficiencies in arithmetic that they cannot profit to any extent at least at the time of entering high school from a study of essential mathematics. For some time, mathematics teachers have felt that a special course should be developed for students who enter high school with achievement in mathematics below the sixth-grade level. This course in Basic Mathematics is designed to meet the needs of these students. It is designed as a two-semester course with the expectation that those who complete it will have achieved sixth-grade competency and will then be qualified to take the essential mathematics work.

The committee which prepared the outline for this course is of the opinion that two principal causes of serious deficiencies in arithmetic are a lack of understanding of the decimal system of notation and a lack of knowledge of the basic facts of addition, subtraction, multiplication, and division in this system. Basic Mathematics is designed to develop the basic concepts, understandings, and skills of arithmetic beginning with a thorough review of the place system of decimal notation and through a thorough mastery of the basic facts.

Without this firm foundation further practice in the fundamental operations with whole numbers, common fractions and decimal fractions, and per cents seems to be of little value. It is the aim of Basic Mathematics to develop foundation concepts, skills, and understandings of arithmetic through experiences which are pertinent to the interests of the chronological ages of students who will take the course.

Since textbook materials of this nature have not as yet been developed, it is the hope of the committee that teachers will give the experimental materials in the units of Basic Mathematics I a thorough test in the classroom and report their reactions both pro and con to the Department of Curriculum Development so that any necessary revisions may be made. It will be appreciated if these reactions are sent at the completion of each unit rather than at the end of the course.

BENJAMIN C. WILLIS

General Superintendent of Schools

BASIC MATHEMATICS PROGRAM

Any study of the trend of school populations will indicate that high school enrollments will continue to increase for the next several years. This increase in the number of students in high schools coupled with world-wide emphasis on mathematics and science will lead more and more pupils into mathematics classes. Not all of these young people will be able to do the work of the regular high school mathematics curriculum.

Our Chicago High School population represents a wide range in ability. So that all of our high school students may have the opportunity of being enrolled in courses best suited to their abilities our committee was concerned with developing a course to meet the needs of the mathematically weak student. We feel such a course is essential. With a cosmopolitan school enrollment such as Chicago has, some pupils are poor achievers because of conditions over which they have no control. Some of the more common reasons for their weaknesses in mathematics are:

1. Lack of educational opportunities prior to enrollment in Chicago schools
2. Transiency - local and regional
3. Lack of native ability
4. Lack of interest

This course of study in Basic Mathematics is designed to meet the needs of pupils entering high school with achievement in arithmetic below sixth-grade level. It is set up as a two-semester course in the expectation that those who complete it will have achieved sixth grade competency and will be qualified to take Essential Mathematics.

If a high school program in Basic Mathematics for those achieving below sixth-grade level in mathematics is to result in functional competence in simple arithmetic understandings and processes it must contain those elements which will motivate slow learners to desire self-improvement. To initiate this self-directive instruction we suggest:

1. Class memberships: restricted in number
2. Attractive classrooms
3. Adequate work materials and texts
4. A multiplicity of sensory and manipulative devices
5. Interested, enthusiastic, and skilled teachers

The Committee

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OBJECTIVES OF BASIC MATHEMATICS

1. To develop an insight into and a mastery of the basic addition, subtraction, multiplication, and division facts
2. To develop a clear connection between this information and its use in life situations
3. To develop an attitude of good workmanship, accuracy, and adequate speed through an understanding of mathematical skills and concepts
4. To develop the ability to estimate an answer with reasonable accuracy
5. To develop the ability to use appropriate mathematical equipment
6. To develop sufficient understanding and competency to be able to profit from instruction in Essential Mathematics

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BASIC MATHEMATICS I

UNIT I

THE NUMBER SYSTEM

A. Understanding the Number System

(SUGGESTIONS FOR TEACHING ASSIGNMENT 1)

Typically, the student in Basic Mathematics has very little understanding of the number system and how it operates. In some cases, the student may have missed the explanation when it was given in elementary school. In others, the student had not attained sufficient mental maturity at the time to enable him to acquire the necessary understandings. However, as a student becomes chronologically older, there is some increase in mental age. At this time, all or at least most of the students in Basic Mathematics should be able to attain some basic knowledge of the number system and how it operates.

The student must understand that the position of a digit in a number is of prime importance. The place of a figure in a number determines its value. In the numbers 274 and 852 the position of the 2's in each number stand for two entirely different values. The more thoroughly students understand place value, the easier it will be to explain the fundamental operations (addition, subtraction, multiplication, division).

The numbers from 1 to 9 represent one-place numbers and are called "ones." Examples: the number 6 means 6 ones
the number 9 means 9 ones

The one-place numbers are also referred to as "units." The development of the number system is better understood by the student in Basic Mathematics by the use of the word "ones" instead of the word "units."

The numbers from 10 to 99 represent two-place numbers. The two-place number is a combination of tens and ones. Examples:

the number 13 means 1 ten and 3 ones

the number 47 means 4 tens and 7 ones

the number 96 means 9 tens and 6 ones

The numbers from 100 to 999 represent three-place numbers. The three-place number is a combination of hundreds, tens and ones.

Examples: the number 173 means 1 hundred 7 tens 3 ones

the number 849 means 8 hundreds 4 tens 9 ones

the number 962 means 9 hundreds 6 tens 2 ones

At this point it would be wise to put a chart on the blackboard and fill in the numbers listed above. Chart is on next page.

ONES	TENS	HUNDREDS
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9

HUNDREDS	TENS	ONES
	1	3
	4	7
	9	6
1	7	3
8	4	2
9	6	2

Emphasize that whether a figure means ones or tens or hundreds is shown by the position of that figure in the number.

The relationship between the places is important.

The student must understand that our number system is a tens system because 10 of each smaller unit makes one of the next larger units.

10 ones = 1 ten

10 tens = 1 hundred

Show several examples at the blackboard:

23 means 2 tens and 3 ones or 23 ones
(changing 2 tens to 20 ones)

47 means 4 tens and 7 ones or 47 ones
(changing 4 tens to 40 ones)

92 means 9 tens and 2 ones or 92 ones
(changing 9 tens to 90 ones)

B. Zero Difficulties

(SUGGESTIONS FOR TEACHING ASSIGNMENT 2)

Zero has two purposes in our number system. They are:

1. To indicate nothing or "not any"
2. To serve as a place holder

Ask this question:

"What do the zero's mean in the box score?"

	1	2	3	4	5	6	7	8	9
YANKEES	0	0	0	2	0	0	0	0	0
WHITE SOX	0	0	0	0	0	0	0	0	3

The answers to questions such as this should be used to bring out the idea of zero meaning nothing or not any.

As a place holder, zero keeps the numbers next to it in their proper place. Have the students read these numbers:

905 370 207

Without the zeros they become 95 37 27

The zeros keep the other numbers in their correct position. In the first example, 905, the 9 is in the hundreds place and means 9 hundreds (900). When the zero is left out the 9 moves over to the tens place and becomes 9 tens or 90. The zero also indicates that there are none or "not any" of that particular unit in that number. In the number 905, the zero means there are no tens in this number. Before going to the exercises, it would be well to go over this idea with the other two numbers listed above (370 and 207).

ASSIGNMENT 1

1. Write these numbers in figures:
 - a. 9 tens and 3 ones _____
 - b. 5 tens and 7 ones _____
 - c. 2 hundreds 3 tens 5 ones _____
 - d. 5 hundreds 7 tens 9 ones _____
2. In each number below, put an X on each 5 that is in the ones' place:

645
759
231
817
573

933
515
729
635
937
3. In the numbers listed in Problem 2, put a circle around each 3 that is in the tens' place.
4. In the numbers listed in Problem 2, put a line under each 7 that is in the hundreds place.
5. In the number 55, the 5s look the same. How do we know what each 5 means?
6. Tell the name of the place of each figure and what it means in the numbers listed below:

49
623
8
7. Fill in the blank spaces:
 - a. The number 3 means _____ ones.
 - b. The number 67 means _____ tens and _____ ones.
 - c. The number 943 means _____ hundreds _____ tens _____ ones
8. Write the largest:
 - a. One-place number _____
 - b. Two-place number _____
 - c. Three-place number _____
9. Write the smallest:
 - a. One-place number _____
 - b. Two-place number _____
 - c. Three-place number _____
10. Fill in the blanks:
 - a. 38 means 3 tens and 8 ones or _____ ones.
 - b. 72 means 7 tens and 2 ones or _____ ones.
 - c. 89 means 8 tens and 9 ones or _____ ones.

EXTRA CREDIT

Fill in the blanks:

- a. 293 means _____ hundreds _____ tens _____ ones or _____ ones.
- b. 548 means _____ hundreds _____ tens _____ ones or _____ ones.
- c. 706 means _____ hundreds _____ tens _____ ones or _____ ones.

ASSIGNMENT 2

ASSIGNMENT 2

1. In each number what does the zero mean?

a. 908

b. 60

c. 760

d. 1056

2. Fill in the blank spaces:

a. In the number 605 the number 6 is in the _____ place, 0 is in the _____ place and the 5 is in the _____ place.

b. In the number 980 the ones' number is _____, the tens' number is _____ and the hundreds' number is _____.

3. Write the following numbers:

a. 8 in the hundreds' place, 0 in the tens' place, 6 in the ones' place _____.

b. 0 in the ones' place, 5 in the tens' place, 9 in the hundreds' place _____.

4. Write three numbers that have zeros in the tens' place:

5. Write three numbers that have zeros in the ones' place:

6. For the number 704 answer the following:

a. What does the zero mean? _____

b. What does the 0 do for the 7? _____

7. Each number has a zero in it. Next to each number write the number you obtain when you leave out the zero (Example a has been done for you.)

a. 903 93

b. 709 _____

c. 60 _____

d. 20 _____

e. 400 _____

f. 303 _____

g. 80 _____

h. 707 _____

In the reading of 4- and 5-place numbers, a common error is inserting the word "and" where it does not belong. The word "and" is reserved for reading mixed decimals.

<u>Example</u>	<u>Incorrect</u>	<u>Correct</u>
3,892	Three thousand, eight hundred and ninety-two	Three thousand, eight hundred ninety-two

When a number has more than three places, a comma is inserted to separate the hundreds from the thousands. To bring out this point, place a column of numbers on the blackboard without commas and have the students read them aloud. Then insert the commas and show how much easier it is to read the numbers with commas than without commas.

<u>Without Commas</u>	<u>With Commas</u>
7892	7,892
53627	53,627
98809	98,809
40033	40,033

The concept of the size of four- and five-place numbers is something that has to be explained to students in Basic Mathematics. Of course you can think of examples of your own to illustrate the point but you can use the following examples:

To illustrate 4-place numbers (the number underlined in the problem)

1. Stan Musial of the St. Louis Cardinals has made over 3,000 hits during his major league career. If he made one hit per game it would take him almost 20 years to get 3000 hits.
2. If you counted one-dollar bills at the rate of one per second (60 per minute) it would take a little over $2\frac{1}{2}$ hours to count \$9,000.

To illustrate 5-place numbers

1. Comiskey Park will seat 46,550 people. If 100 people per minute entered the park, it would take almost 3 hours to fill the park.
2. From Chicago to Los Angeles by car is 2,219 miles. If you travel 60 miles per hour it will take almost 37 hours to drive from Chicago to Los Angeles.

C. Mastery of Reading and Writing Numbers

(SUGGESTIONS FOR TEACHING ASSIGNMENT 3)

Reading numbers of 4 and 5 places has become an almost absolute necessity in today's world. Following are examples taken from one days newspaper.

- 1. State payrolls hit new high: 54,973 jobs
- 2. Damage was estimated at \$50,000 after a fire swept Armour & Co. refrigerator car repair yard.
- 3. The roof and walls of a 1-1/2 story brick building at 3220 Maple collapsed, causing \$35,000 damage.

Although some of the students may run into difficulties with large numbers, an attempt should be made to teach the meaning and use of 4 and 5 place numbers.

Review the basic principles of our number system -

- a. It is a tens' system (10 ones = 1 ten; 10 tens = 1 hundred).
- b. The value of a digit is determined by the place or position in which it is written.
- c. Zero means not any. Zero also serves as a place-holder in a number when there is no digit in a place.

To start the work with four-and five-place numbers it would be helpful to place on the blackboard some 4-and 5-place numbers that have some meaning to the student, such as:

- a. The distance from Chicago to San Francisco is 2195 miles.
- b. The number of students in your school.
- c. 32,354 people attended the White Sox-Yankee game.
- d. 98,792 DeSoto automobiles were manufactured in 1957.

Write a three-place number on the blackboard, such as 423, then put in a thousands number.

9,423 (Emphasize that the 9 is still read 9 and the word thousands is said after the 9.)

Then put in a ten-thousands number.

69,423 (Emphasize that the 69 is still read 69 and the word thousands is said after the 69.)

Draw a chart on the blackboard to indicate the four and five place numbers. Fill in the two examples above and have the students read the numbers aloud.

After the students have studied the chart carefully and the examples have been explained, place the numbers listed below in the chart and have the students read them aloud.

TEN THOUSANDS	THOUSANDS	HUNDREDS	TENS	ONES
	9	4	2	3
6	9	4	2	3

23,672	23,907	64,007	8,998
49,830	93,070	89,654	50,973
60,006	9,053	30,305	89,003

ASSIGNMENT 3

1. Copy the numbers below. Place commas where they belong. Read the numbers.

- | | | | |
|----------|----------|----------|----------|
| a. 3675 | d. 6580 | g. 89099 | j. 3100 |
| b. 54768 | e. 19001 | h. 14030 | k. 28008 |
| c. 7866 | f. 6050 | i. 40900 | l. 69000 |

2. Using the numbers in Problem 1, write:

- The number with the largest figure in the ones' place _____
- The number with the smallest figure in the thousands' place _____
- The number with the largest figure in the tens' place _____
- The number with the largest figure in the ten-thousands' place _____

3. Write these numbers in figures (be sure to place commas correctly):

- Three thousand, six hundred thirty-five _____
- Fifty-two thousand, nine hundred eighty-two _____
- Sixty-four thousand, seven hundred _____
- Eight thousand, eight _____
- Fifteen thousand, fifty _____
- Forty thousand _____

4. Read these sentences. Write the numbers that appear in each problem in figures at the end of the problem.

- Sixty-one thousand, two hundred seven people attended the last game of the World Series between New York and Milwaukee in 1957. _____
- Each Milwaukee player received eight thousand, nine hundred twenty-four dollars for playing in the World Series in 1957. _____
- Babe Ruth hit seven hundred fourteen home runs during his major league career. _____
- The enrollment at the University of Chicago in 1957 was seven thousand, two hundred ninety-two students. _____

5. Why is a comma used between the thousands' and hundreds' place?

6. Write the largest and smallest:

- | | LARGEST | SMALLEST |
|-------------------|---------|----------|
| a. 4-place number | _____ | _____ |
| b. 5-place number | _____ | _____ |

7. Write the number that means:

- 4 hundreds 8 tens 6 ones _____
- 9 thousands 8 hundreds 4 tens 3 ones _____
- 7 thousands 9 hundreds 5 tens 2 ones _____
- 3 thousands 4 hundreds _____
- 7 hundreds 2 ones _____
- 5 thousands 6 ones _____

8. Write the following:

a. 2 four-place numbers _____

b. 2 five-place numbers _____

9. Put each number in its proper place in the table:
(The first one has been done for you.)

	TEN THOUSANDS	THOUSANDS	HUNDREDS	TENS	ONES
a. 37,823	3	7	8	2	3
b. 89,629					
c. 7,225					
d. 6,405					
e. 28,096					
f. 80,702					
g. 63,000					
h. 7,009					
i. 58,276					
j. 9,000					

10. Draw a ring around the largest number.

2063

1389

7654

5912

11. Using the numbers in Problem 10, which of these numbers has the:

a. most tens _____

b. most ones _____

c. most hundreds _____

12. What is the largest number you can write, using each of these figures only once? 3, 5, 7, 8 _____

13. How many different three-place numbers can you write, using each of these figures only once in each number? 2, 5, and 8
Write these numbers in the spaces below.

D. Rounding Off Numbers

(SUGGESTIONS FOR TEACHING ASSIGNMENT 4)

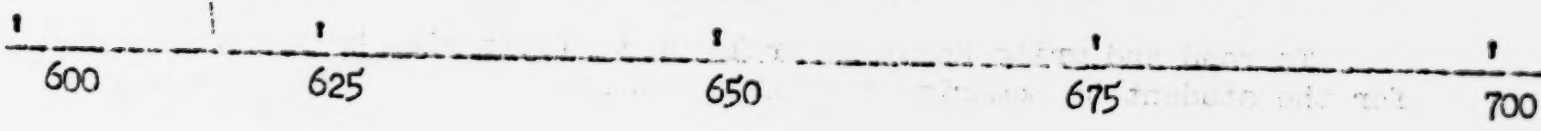
Every day we see and hear statements like the following:

- 31,892 people attended the Cubs-Dodgers double-header
- 38,426 people were killed in automobile accidents in 1957
- 4,806,712 cars were manufactured in the U.S. in 1957

In each of these cases, if you were to remember these numbers, you would probably remember them as 32,000 and 33,000 and 4,800,000 respectively. Whether people are conscious of it or not, they round off numbers in everyday situations.

It would be best to start with rounding off to tens but there are not enough practical examples to use to make it worth while to spend a good deal of time on it. We will start by rounding off to hundreds.

In rounding off to hundreds, we round off to the hundred that the number is nearest to. A chart will assist in seeing this:



Using a pointer, point out the following numbers on the scale and have the student indicate whether the number is closer to 600 or 700.

612	649	681
630	654	692
643	672	699

Someone will ask about the middle number, 650. This number (650) is rounded off to the next larger hundred (700).

Another way to help illustrate rounding to hundreds would be to write the numbers from 200 to 300 in tens. Have one of the pupils circle the middle number (250). Then round off each of the following numbers to the nearest hundred, according as it is closer to 200 or 300.

200	216	244	249
210	275	268	222
220	234	203	299
230	283	298	251
240			
250			
260			
270			
280			
290			
300			

E. Roman Numerals

(SUGGESTIONS FOR TEACHING ASSIGNMENT 5)

The Roman number system, which has been replaced in daily use by our Arabic number system is the best-known of the ancient number systems. After more than two thousand years, we still use Roman numerals for:

1. Headings in outlines
2. Publication date of a book
3. Production date under the title of a motion picture
4. Numbers on sundials and clock faces
5. Dates on cornerstones of buildings
6. Numbering chapters in books
7. Separating some of the books of the Bible from the numbers of the chapters within them

For the student in Basic Mathematics we will limit our work with Roman numerals to numbers four and seven above. We will also limit the range in this group to reading and writing forms up to 12 and recognizing forms for 5, 10, 20, 25, 50, 100 and 1000.

To read and write Roman numerals up to 12 it will be necessary for the student to memorize the three letters

$$I = 1$$

$$V = 5$$

$$X = 10$$

Using some of the elementary ideas, such as flash cards to get the students to memorize these, is helpful. In working with Roman numerals these two principles should be remembered:

- a. For every I that comes after V or X we add 1
- b. For every I that comes before V or X we subtract 1

Using these two principles develop each of the numbers from 1 to 12.

I = 1	V = 5	IX = 9
II = 2	VI = 6	X = 10
III = 3	VII = 7	XI = 11
IV = 4	VIII = 8	XII = 12

Students should practice writing these numbers either at their desks or at the blackboard.

Students in Basic Mathematics should be able to recognize the Roman numeral forms for 5, 10, 25, 50, 100 and 1000. Put each of the forms on the blackboard and have the students go over them individually and in the group.

5 = V	20 = XX	50 = L	1000 = M
10 = X	25 = XXV	100 = C	

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ASSIGNMENT 4

1. Using the chart below round off the numbers below the chart to the nearest hundred.

300	325	350	375	400
a. 329	d. 395	g. 399	j. 349	
b. 385	e. 304	h. 351	k. 350	
c. 318	f. 367	i. 301	l. 333	

2. 800
810
820
830
840
850
860
870
880
890
900
- In the list of numbers at the left circle the middle number. Round off each number below to the nearest hundred.

a. 837	g. 801
b. 879	h. 820
c. 816	i. 863
d. 885	j. 875
e. 849	k. 851
f. 899	l. 850

3. Round off each number to the nearest hundred.

a. 857	d. 5,892	g. 429
b. 2,342	e. 3,627	h. 682
c. 7,659	f. 12,261	i. 35,738

4. In each problem below round off each number to the nearest hundred.

a. 724 miles	
b. 943 radios	
c. 351 books	
d. 297 students	
e. 7896 TV sets	

5. The table below gives the distances by car from Chicago to the cities listed.

TO	MILES	TO	MILES
New York	831	Norfolk, Va.	889
San Francisco	2195	Pittsburgh	457
Baltimore	688	Dallas	951
Cincinnati	294	Denver, Colo.	1039
Detroit	272	Los Angeles	2219

Round off each of the distances to the nearest 100.
New York has been done for you.

<u>City</u>	<u>Nearest Hundred</u>	<u>City</u>	<u>Nearest Hundred</u>
New York	800	Norfolk, Va.	
San Francisco		Pittsburgh	
Baltimore		Dallas	
Cincinnati		Denver, Colo.	
Detroit		Los Angeles	

6. The figures below indicate the number of each make of car produced in 1957. Round off each number to the nearest 100.

Cadillac	121,755	Edsel	45,721
DeSoto	98,792	Rambler	76,308

7. Listed below are the enrollments of universities in Chicago for 1957. Round off each number to the nearest 100.

Chicago Teachers College	3,642
DePaul University	6,666
Loyola University	7,485
Roosevelt University	3,950
University of Chicago	7,219

8. The six tallest buildings in Chicago and their heights are listed below. Round off each number to the nearest hundred.

	<u>HEIGHT</u>	<u>NEAREST HUNDRED</u>
Board of Trade	605 feet	
Prudential Building	601 feet	
Pittsfield Building	557 feet	
Kemper Insurance Building	555 feet	
Field Building	535 feet	
One LaSalle Street	530 feet	

9. The attendance at the All-Star Baseball games for 1955-1957 are listed below. Round off each number to the nearest hundred.

	<u>ATTENDANCE</u>	<u>NEAREST HUNDRED</u>
1955	45,314	
1956	28,843	
1957	30,693	

ASSIGNMENT 5

1. Copy and fill in the Roman numerals for each of the following numbers.

- | | | | |
|------------|------------|------------|-------------|
| a. 9 _____ | d. 2 _____ | g. 7 _____ | j. 12 _____ |
| b. 4 _____ | e. 3 _____ | h. 5 _____ | k. 11 _____ |
| c. 6 _____ | f. 8 _____ | i. 1 _____ | l. 10 _____ |

2. Copy and fill in the regular or Arabic numbers for each of the following Roman numerals.

- | | | | |
|--------------|-------------|--------------|---------------|
| a. IX _____ | d. X _____ | g. XI _____ | j. II _____ |
| b. XII _____ | e. V _____ | h. VII _____ | k. III _____ |
| c. IV _____ | f. VI _____ | i. I _____ | l. VIII _____ |

3. At the end of each sentence, write in Roman numerals the number that appears in each problem.

- Ernie Banks hit two home runs in yesterday's game. _____
- John Landry ran the mile in four minutes. _____
- Nellie Fox had nine assists in yesterday's game with the Yankees. _____
- There are eight teams in each of the major leagues. _____

4. What Roman numerals can you use to show in cents each of the following:

- | | |
|-------------------|------------------|
| a. 1 penny _____ | d. 3 cents _____ |
| b. 1 nickel _____ | e. 4 cents _____ |
| c. 1 dime _____ | f. 8 cents _____ |

5. Make a list of all the different ways you have seen Roman numerals used.

6. Make 2 clock faces. On one, put the regular numbers and on the other the Roman numerals.

7. The numbers below are the numbers on a set of encyclopedias on a shelf.

VI, IX, III, II, X, V, I, IV, VIII, VII

Put the books in the correct order. (The first one has been done.)

I _____

8. On the line at the end of the problem, write the Roman numeral which would come first in a book.

- a. Chapter IX or Chapter V? _____
 b. Chapter III or Chapter IV? _____
 c. Chapter IX or Chapter XI? _____
 d. Chapter VII or Chapter II? _____

9. The first five volumes of a set of encyclopedias are listed at the right. Write in Roman numerals in what volume you would find each word.

Volume I	A - ANNO
Volume II	ANNU-BALTIC
Volume III	BALTIM-BRAIL
Volume IV	BRAIN-CASTIN
Volume V	CASTIR-COLE

- a. Bible _____ c. Asia _____ e. Bridge _____
 b. Africa _____ d. Cove _____ f. Alabama _____

10. Take one of your textbooks from another class and write:

Name of book _____

What page does each chapter start on?

Chapter I	_____	V	_____
II	_____	VI	_____
III	_____	VII	_____
IV	_____	VIII	_____

11. Copy and fill in the Roman numerals for each of the following numbers

- a. 50 _____ c. 10 _____ e. 5 _____ g. 7 _____
 b. 25 _____ d. 1000 _____ f. 20 _____ h. 100 _____

12. Copy and fill in the regular or Arabic numbers for each of the following Roman numerals.

- a. X _____ c. C _____ e. XX _____ g. IX _____
 b. XXV _____ d. M _____ f. L _____ h. V _____

13. At the end of each sentence, write the Roman numeral for the number that appears in each problem.

- a. John finished reading Chapter Ten in the book. _____
 b. The boat was one thousand feet long. _____
 c. There are one hundred students in the Honor Society. _____
 d. Chicago's last World's Fair was twenty-five years ago. _____

ADDITION OF WHOLE NUMBERS

In the operation of addition of whole numbers the following material should be taught:

1. Mastery of basic addition facts
2. Addition of numbers (up to 4 five-place numbers)
3. Word problems

A. Basic Addition Facts

(TEACHING SUGGESTIONS FOR ASSIGNMENT 6)

The first step in addition is the mastery of the basic addition facts. The importance of these facts cannot be over-emphasized. One of the foremost authorities on the teaching of arithmetic states that one of the two chief causes of errors in addition is an inadequate knowledge of the basic addition facts. These facts consist of all possible combinations of two one-place numbers from 0 to 9 inclusive. These 100 combinations are:

0	0	0	0	0	0	0	0	0	0
0	1	2	3	4	5	6	7	8	9
1	1	1	1	1	1	1	1	1	1
0	1	2	3	4	5	6	7	8	9
2	2	2	2	2	2	2	2	2	2
0	1	2	3	4	5	6	7	8	9
3	3	3	3	3	3	3	3	3	3
0	1	2	3	4	5	6	7	8	9
4	4	4	4	4	4	4	4	4	4
0	1	2	3	4	5	6	7	8	9
5	5	5	5	5	5	5	5	5	5
0	1	2	3	4	5	6	7	8	9
6	6	6	6	6	6	6	6	6	6
0	1	2	3	4	5	6	7	8	9
7	7	7	7	7	7	7	7	7	7
0	1	2	3	4	5	6	7	8	9
8	8	8	8	8	8	8	8	8	8
0	1	2	3	4	5	6	7	8	9
9	9	9	9	9	9	9	9	9	9
0	1	2	3	4	5	6	7	8	9

Every device should be used to enable the students to memorize these basic facts. In most cases the students know them and it is a matter of improving their speed and accuracy. Some of the devices which might be used are the following:

1. Use flash cards.
2. Five minute oral review each day at the beginning of the class period.
3. Mimeograph the 100 basic facts and distribute to the students.
4. Mix up the 100 basic facts and have them mimeographed and distributed.
5. Group combinations together which have the same sum (called number families).

Listed below are the number families 2, 3 and 4:

Sum of 2

$$0+2=2$$

$$2+0=2$$

$$1+1=2$$

Sum of 3

$$0+3=3$$

$$3+0=3$$

$$1+2=3$$

$$2+1=3$$

Sum of 4

$$0+4=4$$

$$4+0=4$$

$$3+1=4$$

$$1+3=4$$

$$2+2=4$$

By placing these on the blackboard in this form the student sees that there is no order to addition.

6. Place this chart on the blackboard.

	8	2	0	5	1	9	7	3	4	6
7										
3										
5										
9										
1										
6										
2										
0										
4										
8										

Have a student go to the board and add a number in the left-hand column to each of the numbers at the top. Such as:

$$7+8=15$$

$$7+2=9$$

etc.

B. Adding Without Carrying

Adding two-place numbers without carrying is the most logical place to start the work in addition. To explain the operation of addition it is necessary to go back to the meaning of place value.

$$\begin{array}{r} \text{To add 43 and 35:} \\ 43 = 4 \text{ tens} + 3 \text{ ones} \\ 35 = 3 \text{ tens} + 5 \text{ ones} \\ \hline 7 \text{ tens} + 8 \text{ ones} \\ \text{or } 70 + 8 = 78 \end{array}$$

To add these numbers it is necessary to know the basic facts of addition and the idea of place value. The teacher should do several examples of the same type on the blackboard.

$$\begin{array}{r} 62 = 6 \text{ tens} + 2 \text{ ones} \\ 27 = 2 \text{ tens} + 7 \text{ ones} \\ \hline 8 \text{ tens} + 9 \text{ ones} \\ \text{or } 80 + 9 = 89 \end{array} \qquad \begin{array}{r} 26 = 2 \text{ tens} + 6 \text{ ones} \\ 41 = 4 \text{ tens} + 1 \text{ one} \\ \hline 6 \text{ tens} + 7 \text{ ones} \\ \text{or } 60 + 7 = 67 \end{array}$$

Before moving on to the short method the same procedure should be applied to three-place numbers.

$$\begin{array}{r} 342 = 3 \text{ hundreds} + 4 \text{ tens} + 2 \text{ ones} \\ 256 = 2 \text{ hundreds} + 5 \text{ tens} + 6 \text{ ones} \\ \hline 5 \text{ hundreds} + 9 \text{ tens} + 8 \text{ ones} \\ \text{or } 500 + 90 + 8 = 598 \end{array} \qquad \begin{array}{r} 678 = 6 \text{ hundreds} + 7 \text{ tens} + 8 \text{ ones} \\ 221 = 2 \text{ hundreds} + 2 \text{ tens} + 1 \text{ one} \\ \hline 8 \text{ hundreds} + 9 \text{ tens} + 9 \text{ ones} \\ \text{or } 800 + 90 + 9 = 899 \end{array}$$

When the student understands the process of addition outlined above then it is proper to move on to the short form. Use the examples above:

$$\begin{array}{r} 43 \\ 35 \\ \hline \end{array} \qquad \begin{array}{r} 62 \\ 27 \\ \hline \end{array} \qquad \begin{array}{r} 26 \\ 41 \\ \hline \end{array} \qquad \begin{array}{r} 342 \\ 256 \\ \hline \end{array} \qquad \begin{array}{r} 678 \\ 221 \\ \hline \end{array}$$

Having the students copy numbers and add is an excellent way to bring out the idea of place value.

Put examples on the board (in pairs) as follows:

$$\begin{array}{r} 43 \quad 43 \\ 5 \quad 5 \\ \hline \end{array} \qquad \begin{array}{r} 246 \quad 246 \\ 3 \quad 3 \\ \hline \end{array} \qquad \begin{array}{r} 723 \quad 723 \\ 27 \quad 27 \\ \hline \end{array}$$

Explain in each case that the first example in each set is correct and the second one is incorrect because in addition only like quantities can be added. In each pair of examples the second one is incorrect because the quantities are unlike. (In the first pair of examples the 4 is 4 tens and the 5 is 5 ones.)

C. Word Problems

(TEACHING SUGGESTIONS FOR ASSIGNMENT 7)

It is important to be able to apply the ability to add to the solution of word problems. In solving word problems the following steps are suggested:

1. Read the problem carefully.
2. Decide what facts are given.
3. Decide what you are to find.
4. Decide how you will find the desired result.
5. Do the computation and check.

We add to find:

1. The total cost of two or more things
2. How many in a whole group when we know the number in each part of a group
3. How many in all, all together, total number, both or together.

Facility in solving word problems comes with practice. This unit, and the other units that follow, contain a great many problems that will afford such practice.

ASSIGNMENT 6

1. In each problem add by the long method.
(Example a has been done for you.)

a. $54 = 5 \text{ tens} + 4 \text{ ones}$

$25 = 2 \text{ tens} + 5 \text{ ones}$

$7 \text{ tens} + 9 \text{ ones}$

or $70 + 9 = 79$

b. $67 = \underline{\hspace{1cm}} \text{ tens} + \underline{\hspace{1cm}} \text{ ones}$

$31 = \underline{\hspace{1cm}} \text{ tens} + \underline{\hspace{1cm}} \text{ ones}$

$\underline{\hspace{1cm}} \text{ tens} + \underline{\hspace{1cm}} \text{ ones}$

or $\underline{\hspace{1cm}} + \underline{\hspace{1cm}} =$

c. $243 = \underline{\hspace{1cm}} \text{ hundreds} + \underline{\hspace{1cm}} \text{ tens} + \underline{\hspace{1cm}} \text{ ones}$

$526 = \underline{\hspace{1cm}} \text{ hundreds} + \underline{\hspace{1cm}} \text{ tens} + \underline{\hspace{1cm}} \text{ ones}$

d. $728 =$

$641 =$

2. Add:

(a) $\begin{array}{r} 47 \\ 22 \\ \hline \end{array}$

(b) $\begin{array}{r} 63 \\ 26 \\ \hline \end{array}$

(c) $\begin{array}{r} 45 \\ 54 \\ \hline \end{array}$

(d) $\begin{array}{r} 87 \\ 12 \\ \hline \end{array}$

(e) $\begin{array}{r} 24 \\ 45 \\ \hline \end{array}$

(f) $\begin{array}{r} 625 \\ 342 \\ \hline \end{array}$

(g) $\begin{array}{r} 234 \\ 645 \\ \hline \end{array}$

(h) $\begin{array}{r} 873 \\ 216 \\ \hline \end{array}$

(i) $\begin{array}{r} 452 \\ 347 \\ \hline \end{array}$

(j) $\begin{array}{r} 674 \\ 225 \\ \hline \end{array}$

3. Add 21 to each of these numbers: 35, 47, 58, 26, 75, 86
(The first one has been done for you.)

$\begin{array}{r} 35 \\ +21 \\ \hline 56 \end{array}$

4. In problems in addition zeros appear. Remember that one of the meanings of zero is "nothing or not any." When you add zero to a number you are adding nothing to it so you get as an answer the number itself.

Add: (a) $\begin{array}{r} 27 \\ 30 \\ \hline 57 \end{array}$

(b) $\begin{array}{r} 40 \\ 36 \\ \hline 76 \end{array}$

(c) $\begin{array}{r} 486 \\ 510 \\ \hline \end{array}$

(d) $\begin{array}{r} 803 \\ 166 \\ \hline \end{array}$

(e) $\begin{array}{r} 68 \\ 20 \\ \hline \end{array}$

(f) $\begin{array}{r} 40 \\ 59 \\ \hline \end{array}$

(g) $\begin{array}{r} 603 \\ 295 \\ \hline \end{array}$

(h) $\begin{array}{r} 279 \\ 300 \\ \hline \end{array}$

5. Circle each number below that is not in its correct position.
Do not add.

$$\begin{array}{r} 723 \\ 8 \\ \hline 92 \\ 83 \\ \hline 89 \end{array}$$

$$\begin{array}{r} 403 \\ 90 \\ \hline 67 \\ 5 \\ \hline 92 \end{array}$$

$$\begin{array}{r} 86 \\ 403 \\ 9 \\ \hline 27 \\ 28 \\ 6 \\ \hline 42 \end{array}$$

6. Copy and add:

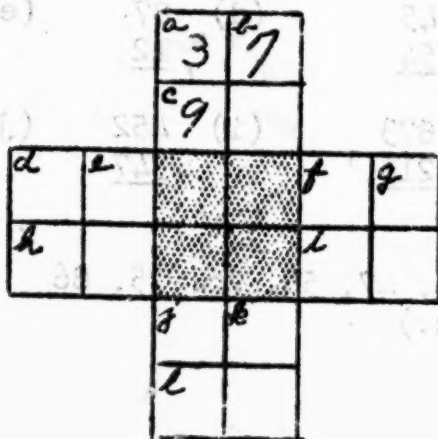
(a) $43 + 655$

(c) $483 + 6$

(b) $207 + 42$

(d) $62 + 7$

7. The arithmetic puzzle below is worked the same way a crossword puzzle is worked. One number to a square. The parts a) across and down have been worked for you.



ACROSS

- a) $14+23$
c) $43+53$
d) $13+5$
f) $31+21$
h) $35+13$
i) $27+12$
j) $20+41$
l) $57+42$

DOWN

- a) $26+13$
b) $32+44$
d) $11+3$
e) $57+31$
f) $41+12$
g) $16+13$
j) $42+27$
k) $13+6$

ASSIGNMENT 7

- For two months Harry kept a record of the number of words he had right in spelling. The first month he had 34 words right; the second month, 55 words. How many words did he have right in all?
- Edward went on a fishing trip with his father. The first day they caught 13 fish; the second day, 11 fish; and the third day, 15 fish. How many fish did they catch all together?
- Jim has 71 stamps in his stamp book. Tom gave him 26 more stamps. How many stamps does Jim have now?
- Ruth sold Christmas seals. She sold 41 seals at school, 23 to her mother and 14 to her father. How many seals did she sell?

D. Money Problems

(TEACHING SUGGESTIONS FOR ASSIGNMENT 8)

The most practical application of addition is in the handling of money. The following topics will be covered regarding money:

1. Reading amounts of money
2. Counting money
3. Making change
4. Cash register receipts

When reading amounts of money be sure to insert the word "and" when you come to the decimal point.

Example: \$3.25 is read "Three dollars and twenty-five cents."

Place the numbers listed below on the blackboard and have the students read them aloud.

\$1.26 \$.52 \$56.80 \$2.07 \$20.08
 \$7.78 \$.99 \$253.94 \$6.06 \$200.02

To gain skill in counting money, set up a table on the blackboard as follows and have the students find the total amount.

DOLLARS	$\frac{1}{2}$ DOLLARS	QUARTERS	DIMES	NICKELS	PENNIES	TOTAL AMOUNT
1	1	2	1	2	3	
2	1	1	2	3	4	
5	1	2	3	1	1	
7		1	2	2		
		3	2	2	4	
1			4	7	8	

In giving change there are two rules to follow:

1. Use the smallest number of coins possible.
2. Return the coin with the least value first.

Place the chart below on the blackboard in order to give practice in making change.

COST	AMOUNT GIVEN TO CLERK	CHANGE					
		CENTS	NICKELS	DIMES	QUARTERS	$\frac{1}{2}$ DOLLARS	DOLLARS
\$.62	\$.75	3		1			
\$.19	\$1.00						
\$.43	\$1.00						
\$1.27	\$2.00						
\$3.34	\$5.00						
\$4.56	\$5.00						
\$2.07	\$5.00						

As you do each example in the table above do the oral work involved. In the first example the clerk would say:

"your purchase was \$.62 \$.65 \$.75"

When adding amounts of money give the following instructions:

1. In copying numbers place decimal point under decimal point.
2. Answers should contain a dollar sign and decimal point.

The teacher will place the following examples on the blackboard for explanation:

\$.23	\$.72	\$2.61	\$72.43	\$67.05	\$204.62
<u>.45</u>	<u>.27</u>	<u>5.36</u>	<u>26.45</u>	<u>21.91</u>	<u>351.31</u>

Our present-day method of purchasing food in large quantities in supermarkets has led to the use of a cash register receipt. The typical receipt is pictured below at the left with an explanation of the abbreviations at the right.

\$.21 Mt B	Mt indicates meat
\$.43 Gr B	B indicates the cash register upon which the
\$.22 Pr B	purchase was rung
	Pr indicates produce
\$.86 Tl B	Tl indicates total amount of purchase

With recent advances in this field the cash register receipt in some chain food stores indicates the amount of money the customer gives the clerk and the amount of change the customer receives.

ASSIGNMENT 8

1. Read the following amounts of money:

- (a) \$.93 (c) \$603.19 (e) \$ 29.42
 (b) \$26.82 (d) \$ 70.07 (f) \$907.09

2. Write in numbers. (Don't forget dollar signs and decimal points.)

- a. Nine dollars and seventeen cents _____
 b. Forty dollars and forty cents _____
 c. Fifty dollars _____
 d. Three hundred dollars _____
 e. Twenty-three cents _____
 f. Sixteen dollars and five cents _____

3. Fill in the total amount of money at the end of each line.

	DOLLARS	1/2 DOLLARS	QUARTERS	DIMES	NICKELS	PENNIES	TOTAL AMOUNT
a.	8	1	1		1		
b.	3		1	1	1	2	
c.		1	1	1	1	1	
d.	2			2	3	6	
e.	5	1	3	4	7	8	

4. How many of each coin would you give in making change for each of the following purchases? (Example a has been done for you.)

	COST	Amount Given to Clerk	CHANGE				
			PENNIES	NICKELS	DIMES	QUARTERS	1/2 DOLLARS DOLLARS
a.	\$1.43	\$2.00	2	1			1
b.	\$2.67	\$5.00					
c.	\$.23	\$1.00					
d.	\$3.55	\$5.00					
e.	\$4.14	\$5.00					
f.	\$1.71	\$2.00					

5. Add: (Be sure and place dollar sign and decimal point in your answer.)

- (a) \$.23 (b) \$2.91 (c) \$47.21 (d) \$681.05
 .46 2.06 21.48 213.82
 (e) \$237.02 (f) \$235.81
 512.81 142.06

6. The table below shows lunchroom prices at a school cafeteria.

Hamburger	\$.25	Pie	\$.15
Frankfurter	\$.20	Cake	\$.14
Milk	\$.03	Potatoes	\$.13
Spaghetti and Meat Balls			\$.41

Using the table above find the cost of:

- Hamburger and milk _____
- Frankfurter and potatoes _____
- Spaghetti and meat ball and pie _____
- Cake and milk _____
- Frankfurter, potatoes, and milk _____

7. The table below shows the amount that is charged on each of the tollroads and turnpikes:

Indiana Toll Road	\$1.95
Ohio Turnpike	\$3.00
Pennsylvania Turnpike	\$4.80

Find the total toll charge in each of the following:

- Indiana and Ohio _____
- Ohio and Pennsylvania _____

8. Find the total for each of the following cash register receipts:

(a)	(b)	(c)
\$.57 Gr A	\$.63 Mt B	\$.31 Pr C
\$.22 Gr A	\$.26 Gr B	\$.45 Mt C
_____ Tl A	_____ Tl B	_____ Tl C

9. Using the cash register receipts in Problem 8 what do each of the abbreviations listed below stand for?

Gr _____ Pr _____ Letters, A, B, C, _____
Mt _____ Tl _____

10. The expenses for a family trip included:

\$3.40 for gasoline
\$2.23 for food
\$1.16 for other expenses

What were the total expenses for the trip?

E. Carrying In Addition

(TEACHING SUGGESTIONS FOR ASSIGNMENT 9)

The next step in addition is the process of carrying. We start with the addition of three or more one-place numbers. In the process of adding three or more one-place numbers we add a seen number to an unseen number. Take the example:

8 We add from top to bottom
 5 Adding 8 and 5 we obtain 13 (an unseen number) and
 6 adding 6 (a seen number) makes 19. To check we
 add from bottom to top. The step of adding the
 seen and unseen number is one of the two chief
 causes of error in column addition (the other is
 inadequate knowledge of the basic facts). The
 student should be shown there is a correct and an
 incorrect way of saying the problem.

Incorrect: 8 and 5 are 13, 13 and 6 are 19

Correct: 13, 19

The student does not repeat each combination as he does it. Time should be spent in oral drill and practice. Place the following examples on the blackboard and call on individual students to add aloud. Do each problem twice (adding up and down).

6	3	6	9	7	9	6	5	8	3	2
8	8	5	3	8	2	7	9	6	4	3
1	2	4	9	4	7	7	6	5	7	8
<u>1</u>	<u>2</u>	<u>4</u>	<u>9</u>	<u>4</u>	<u>7</u>	<u>3</u>	<u>8</u>	<u>8</u>	<u>7</u>	<u>7</u>

How much more practice is needed depends upon the particular group. Rather than spend two or three class periods on drill, the students profit more from a five-minute drill at the beginning of each class period for a period of several weeks.

EXERCISES (Oral Class Work)

Add:

- | | | | | | | |
|---|---|---|---|---|---|---|
| 1) $\begin{array}{r} 9 \\ 1 \\ \hline 6 \end{array}$ | 2) $\begin{array}{r} 8 \\ 3 \\ \hline 5 \end{array}$ | 3) $\begin{array}{r} 5 \\ 8 \\ \hline 6 \end{array}$ | 4) $\begin{array}{r} 7 \\ 9 \\ \hline 8 \end{array}$ | 5) $\begin{array}{r} 2 \\ 9 \\ \hline 3 \end{array}$ | 6) $\begin{array}{r} 9 \\ 7 \\ \hline 5 \end{array}$ | 7) $\begin{array}{r} 9 \\ 3 \\ \hline 7 \end{array}$ |
| 8) $\begin{array}{r} 7 \\ 7 \\ \hline 9 \end{array}$ | 9) $\begin{array}{r} 5 \\ 3 \\ \hline 5 \end{array}$ | 10) $\begin{array}{r} 9 \\ 1 \\ \hline 3 \end{array}$ | 11) $\begin{array}{r} 7 \\ 8 \\ \hline 5 \end{array}$ | 12) $\begin{array}{r} 8 \\ 7 \\ \hline 9 \end{array}$ | 13) $\begin{array}{r} 5 \\ 6 \\ \hline 8 \end{array}$ | 14) $\begin{array}{r} 8 \\ 9 \\ \hline 6 \end{array}$ |
| 15) $\begin{array}{r} 2 \\ 5 \\ \hline 3 \end{array}$ | 16) $\begin{array}{r} 7 \\ 7 \\ \hline 3 \end{array}$ | 17) $\begin{array}{r} 4 \\ 1 \\ \hline 5 \end{array}$ | 18) $\begin{array}{r} 5 \\ 6 \\ \hline 8 \end{array}$ | 19) $\begin{array}{r} 2 \\ 9 \\ \hline 5 \end{array}$ | 20) $\begin{array}{r} 6 \\ 1 \\ \hline 9 \end{array}$ | |

If the students understand the number system (as explained in the first unit) then the process of carrying in addition is not too difficult. Review the following example (no carrying):

$$\begin{array}{r} 36 = 3 \text{ tens} + 6 \text{ ones} \\ +23 = 2 \text{ tens} + 3 \text{ ones} \\ \hline 5 \text{ tens} + 9 \text{ ones} \\ \text{or } 50 + 9 = 59 \end{array}$$

Next review the relationship between the places in the number system.

$$\begin{array}{l} 10 \text{ ones} = 1 \text{ ten} \\ 10 \text{ tens} = 1 \text{ hundred} \end{array}$$

The following example illustrates the process of carrying.

$$\begin{array}{r} 38 = 3 \text{ tens} + 8 \text{ ones} \\ +24 = 2 \text{ tens} + 4 \text{ ones} \\ \hline 5 \text{ tens} + 12 \text{ ones} \\ \text{or } 6 \text{ tens} + 2 \text{ ones} \\ \text{or } 60 + 2 = 62 \end{array}$$

12 ones = 1 ten + 2 ones
Adding the 1 ten to the 5 tens we obtain 6 tens.

This may seem like a very long and laborious process just to explain one operation, but it gives meaning to the process of carrying. Without this explanation it is just rote memorization:

$$8 + 4 = 12 \text{ write down the 2 and carry the 1.}$$

Without this explanation there is no reason why we would not write down the 1 and carry the 2. Do several more examples on the blackboard.

$$\begin{array}{r} 47 = 4 \text{ tens} + 7 \text{ ones} \\ +39 = 3 \text{ tens} + 9 \text{ ones} \\ \hline 7 \text{ tens} + 16 \text{ ones} \\ \text{or } 8 \text{ tens} + 6 \text{ ones} \\ \text{or } 80 + 6 = 86 \end{array}$$

$$\begin{array}{r} 56 = 5 \text{ tens} + 6 \text{ ones} \\ +28 = 2 \text{ tens} + 8 \text{ ones} \\ \hline 7 \text{ tens} + 14 \text{ ones} \\ \text{or } 8 \text{ tens} + 4 \text{ ones} \\ \text{or } 80 + 4 = 84 \end{array}$$

Extend this method to carrying from the tens to the hundreds place.

$$\begin{array}{r} 562 = 5 \text{ hundreds} + 6 \text{ tens} + 2 \text{ ones} \\ +275 = 2 \text{ hundreds} + 7 \text{ tens} + 5 \text{ ones} \\ \hline 7 \text{ hundreds} + 13 \text{ tens} + 7 \text{ ones} \\ \text{or } 8 \text{ hundreds} + 3 \text{ tens} + 7 \text{ ones} \\ \text{or } 800 + 30 + 7 = 837 \end{array}$$

13 tens = 1 hundred + 3 tens
Adding the 1 hundred to the 7 hundreds gives 8 hundreds.

In the same way do the following problems:

$$\begin{array}{r} 496 \\ +133 \\ \hline \end{array}$$

$$\begin{array}{r} 764 \\ +182 \\ \hline \end{array}$$

(TEACHING SUGGESTIONS FOR ASSIGNMENT 10)

During the preceding problems the students may be anxious to do the problem the short way. A good way to make the move would be to have the students put the six problems in Assignment 9 on the blackboard and use them to show the short method of carrying. Using the first example:

$$\begin{array}{r} 68 \\ 27 \\ \hline 95 \end{array}$$

1. Add from top to bottom
2. Write the carried number at the top of the next column
3. Add the carried number to the top number and then proceed down the column.

The steps enumerated above are intended to help students avoid some of the pitfalls in carrying, such as forgetting the carried number, adding the carried number twice, etc. Place the following problems on the blackboard and go over the three steps above in each problem.

$$\begin{array}{r} 17 \\ 75 \\ \hline \end{array}$$

$$\begin{array}{r} 84 \\ 68 \\ \hline \end{array}$$

$$\begin{array}{r} 37 \\ 58 \\ \hline \end{array}$$

$$\begin{array}{r} 195 \\ 342 \\ \hline \end{array}$$

$$\begin{array}{r} 372 \\ 586 \\ \hline \end{array}$$

$$\begin{array}{r} 29 \\ 46 \\ 27 \\ \hline \end{array}$$

$$\begin{array}{r} 423 \\ 897 \\ 48 \\ \hline \end{array}$$

F. Summary and Applications of Addition

(TEACHING SUGGESTIONS FOR ASSIGNMENTS 11 AND 11A)

In Basic Mathematics it is hoped that addition can be extended to cover adding from 7 one-place numbers up to 4 five-place numbers. Whether this can be accomplished depends on the ability of the group. The problems that follow extend the work in addition to cover through fifth grade. The numerical problems that follow have been arranged in order of difficulty.

ASSIGNMENT 11

Add:

1. 7 7 0 <u>2</u>	2. 6 0 8 <u>3</u>	3. 7 3 4 5 3 <u>8</u>	4. 49 57 62 60 55 <u>70</u>	5. 24 35 26 83 71 <u>28</u>	6. 27 13 36 52 18 <u>87</u>
----------------------------	----------------------------	--------------------------------------	--	--	--

7. 412 127 328 455 519 <u>296</u>	8. 58 46 907 <u>909</u>	9. 926 387 328 79 53 <u>84</u>	10. 534 26 19 <u>107</u>	11. 2,204 9,346 1,529 5,237 <u>4,666</u>
--	----------------------------------	---	-----------------------------------	--

12. 7,214 1,806 538 <u>2,837</u>	13. 5,639 756 1,473 960 <u>3,955</u>	14. 75,629 4,759 738 <u>2,497</u>	15. 66 9,116 755 95 <u>4,500</u>
---	--	--	--

16. 35,457 700 397 <u>44,992</u>	17. 50,040 49,865 3,348 <u>760</u>	18. 88,042 3,798 45,260 <u>9,576</u>	19. 807 4,967 18,759 <u>63,395</u>
---	---	---	---

In Problems 20 to 27 be careful of dollar signs and decimal points.

20. \$32.10 <u>10.09</u>	21. \$.03 .38 .29 .63 <u>.43</u>	22. \$6.70 .29 5.42 <u>.60</u>	23. \$6.50 .98 .65 3.48 .09 <u>5.10</u>
-----------------------------	---	---	--

24. \$65.43 7.58 59.65 3.87 <u>30.99</u>	25. \$175.86 .03 26.95 <u>238.61</u>	26. \$ 649 76 3,475 416 <u>539</u>	27. \$1,084 5,578 1,697 3,742 <u>9,207</u>
--	---	--	--

28. \$347.89 264.23 <u>40.62</u>	29. \$2,429.67 3,654.58 <u>7,023.95</u>	30. \$2,059.07 3,700.93 <u>2,649.08</u>
--	---	---

ASSIGNMENT 11A

Copy and add: (Place numbers in the correct column.)

- 31. 24 + 39 + 79 + 45
- 32. 79 + 483 + 613
- 33. 8 + 49 + 7 + 213 + 67
- 34. 1296 + 357 + 98 + 903 + 1897
- 35. 18,623 + 26,862 + 7,548 + 97
- 36. \$19.50 + \$3.75 + \$6.48 + \$75.90
- 37. \$689.21 + \$35.09 + \$2.08
- 38. Seven dollars and thirteen cents, two dollars and nineteen cents, nine dollars and seven cents.
- 39. Thirteen dollars and twenty-six cents, ten dollars and five cents, six dollars and fourteen cents.
- 40. Fill in the puzzle (A has been done for you.)

A	B				C	D
6	1					
E	2		F		G	
		H			I	
			J			

ACROSS

A. 19
+27
+15
61

C. 11
+7
18

E. 198
+23
221

G. 38
27
+79
144

H. 8
14
+55
77

I. 40
+52
92

J. 65
78
+62
205

DOWN

A. 14
19
+29
62

B. 99
+28
127

C. 39
40
+63
142

D. 45
17
+22
84

F. 82
70
+20
172

G. 96
72
+27
195

ASSIGNMENT 11A

1. The following table indicates the number of people killed in automobile accidents in the United States in a recent year:

Under 5 years of age	1,300
Between 5 and 14 years of age .	3,000
Between 15 and 24 years of age .	7,500
Between 25 and 64 years of age .	20,800
Over 65 years of age	6,300

Find the total number of people killed in that year.

2. The table indicates the prices of tools in a hardware store.

STEBBENS HARDWARE			
Hammer	\$2.35	Wood Level	\$3.49
Pliers	\$1.35	Hack Saw	\$2.29
Plane	\$4.29	File	\$1.39
6 ft. Rule	\$1.39	Chisel	\$2.19

Find the cost of each of the following:

- a. Hammer and pliers _____ d. Hack saw and wood level _____
 b. 6 ft. rule and plane _____ e. Pliers and file _____
 c. Plane and file _____ f. Chisel and hack saw _____
3. In purchasing from a mail order catalogue you have to know both price and weight. Listed below are items from a catalogue.

	Price	Weight
Extension light	\$2.49	2 lbs 8 oz.
Automobile seat covers	\$15.95	6 lbs
Men's suit	\$39.50	4 lbs 5 oz.

Find the total cost and total weight.

4. In Chicago, helicopters fly three routes per day covering 108 miles, 95 miles, and 102 miles. The three routes cover a total of how many miles?
5. A helicopter used in spraying crops weighs about 1474 pounds. If the pilot weighs 170 pounds, the fuel and oil 201 pounds and the spray 500 pounds, what is the total weight?
6. John built a tree house. Lumber cost \$5.60, nails \$.79, and paint \$1.43. Find the total cost of the tree house.

7. Find the total for each of the following cash register receipts:

\$.34 Gr. A.	\$1.15 Mt B	\$1.69 Mt C
\$.59 Gr. A	\$.62 Mt B	\$1.73 Mt C
\$.30 Gr. A.	\$1.35 Gr. B	\$2.45 Mt C
\$.09 Gr. A	\$.97 Gr. B	\$.79 Pr C
\$1.06 Mt A	\$1.83 Gr. B	\$.83 Pr C
\$.35 Mt A	\$.62 Gr. B	\$.57 Pr C
\$4.26 Mt A	\$.09 Gr. B	\$1.29 Gr. C
\$.95 Mt A	\$.42 Pr B	\$3.67 Gr. C
_____ Tl A	_____ Tl B	_____ Tl C

8. The expenses for an automobile trip for a family included the following:

\$21.63 for gasoline
 2.45 for oil
 45.87 for food
 67.00 for motor rooms
 6.28 for miscellaneous expenses

How much did the family spend for the trip?

9. Mr. Harry Smith's monthly payments were are follows:

\$85.00 for rent
 29.57 for car
 13.14 for TV set

What was the total amount of his monthly payments?

10. In 1957 the American Motors Company produced three cars; the Rambler, Nash, and the Hudson. The table shows how many of each:

Hudson 1,345
 Nash 3,561
 Rambler 76,308

What was the total number of cars produced?

11. The following list contains the number of people born in the Midwestern States in 1956:

Illinois	225,327	Michigan	204,291
Indiana	114,383	Ohio	233,864
Iowa	64,070	Wisconsin	93,382

Find the total number of people born in the six states.

12. The table indicates the seating capacity of some of the major league baseball parks:

Comiskey Park	46,550
Wrigley Field	36,755
Cleveland	73,811
Philadelphia	33,166

Find the total seating capacity of these parks.

13. Alaska has been admitted as our 49th state. Listed below are some of its principal cities and their population (as of 1950).

Anchorage	11,254	Ketchika	5,305
Juneau	5,956	Fairbanks	5,771

Find the total population of these cities.

14. The attendance at the All-Star Baseball games for the years 1953-1957 is given below:

1957	30,693
1956	28,843
1955	45,314
1954	68,751
1953	30,846

Find the total attendance for these years.

15. The table indicates the seating capacity of football stadiums in the Western Conference.

Northwestern	53,719	Michigan	100,100
Michigan State	76,000	Ohio State	78,677

Find the total seating capacity of these stadiums.

16. The table below indicates the number of people killed in automobile accidents in each state in 1956:

Illinois	2,135	Michigan	1,747
Indiana	1,222	Ohio	2,013
Iowa	699	Wisconsin	955

Find the total number killed in all six states.

17. A bowling match consists of three games. To find your score for a match you add the scores for the three games. Find the total score in each match.

	1st game	2nd game	3rd game	TOTAL
Joe Wilson	235	196	298	_____
Ed Kawolics	236	245	245	_____
Buzz Fazio	218	220	231	_____
Lee Jougland	198	217	227	_____
Steve Nagy	217	225	237	_____

18. Listed below (by years) are the number of failures in business:

1953	8,862
1954	11,086
1955	10,969
1956	12,686

Find the total number of business failures for the years 1953 to 1956.

19. The chart shows the number of Americans killed in each of the wars listed below:

Korean War	54,246
World War I	126,000
World War II	407,828

Find the total number killed in all three wars.

20. Diet has become a big item in today's world. Each food that you eat contains a certain number of calories. Listed below are the number of calories in each type food:

Glass of milk	165 calories	Milk shake	385 calories
Chocolate cake	400 calories	Waffles	225 calories
Chocolate candy bar	250 calories	Hamburger	250 calories
Orange	80 calories	Frankfurter	180 calories
Apple	100 calories		

How many calories are there in each of the following combinations of foods? (a. has been done for you.)

- | | |
|------------------------------------|---------------------|
| | 165 |
| | 180 |
| a. Milk and frankfurter | <u>345 calories</u> |
| b. Milk and chocolate cake | _____ |
| c. Milk shake and hamburger | _____ |
| d. Orange and candy bar | _____ |
| e. Apple and chocolate cake | _____ |
| f. Milk and waffles | _____ |
| g. Frankfurter, milk shake, orange | _____ |
| h. Waffles, milk shake, candy bar | _____ |

21. Listed below are the number of cars produced by Chrysler Corporation in 1957.

Plymouth	518,714
Dodge	226,439
DeSota	91,636
Chrysler	94,221
Imperial	30,495

Find the total number of cars produced.

22. On a trip Mr. McCarthy drove 179 miles in the morning and 214 miles in the afternoon. How many miles did he drive that day?
23. The attendance at the Grant Park Concerts was as follows:

Wednesday night	15,823
Friday night	22,967
Saturday night	23,492

Find the total attendance for the three nights.

ACTIVITIES

Magic squares and number puzzles afford excellent opportunities for practice in addition. In a magic square the sum of the numbers in every straight line (across, up and down, or from corner to corner) is the same.

The figure below is a magic square.

	2	9	4	
	7	5	3	
	6	1	8	
SUM	15	15	15	

SUM
15
15
15

EXERCISES

1. In each figure below add each column and row and from corner to corner and write the sum.

(a)

8	3	4
1	5	9
6	7	2

(b)

3	10	5
8	6	4
7	2	9

(c)

4	18	8
14	10	6
12	2	16

Are these magic squares? Try to make one of your own.

2. Fill in the puzzle. Remember one number to a space.

a	b		c	d		e	f
g			h		i		
	j	k			l	m	
n		o		p		q	
r	s			t	u		
					v	w	x
y		z		A		B	
C				D			

Across

- a) 17 + 34
c) 56 + 36
e) 14 + 68
g) 28 + 62
h) 96 + 77
j) 49 + 42
l) 88 + 41
o) 78 + 99
q) 44 + 35
r) 78 + 68
t) 15 + 48
v) 87 + 50 + 5
z) 56 + 45
B) 15 + 25
C) 49 + 51
D) 736 + 294

Down

- a) 34 + 25
b) 54 + 55
c) 43 + 48
d) 19 + 8
f) 1623 + 1376
i) 15 + 16
k) 48 + 68
m) 18 + 9
n) 63 + 28
p) 37 + 39
s) 16 + 28
u) 17 + 14
w) 200 + 243
x) 99 + 101
y) 37 + 44
z) 7 + 3
A) 9 + 2

BLANK PAGE

$$\begin{array}{cccccccccccc} 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 & 11 & 12 \\ \hline 3 & 3 & 3 & 3 & 3 & 3 & 3 & 3 & 3 & 3 \end{array}$$

$$\begin{array}{cccccccccccc} 4 & 5 & 6 & 7 & 8 & 9 & 10 & 11 & 12 & 13 \\ \hline 4 & 4 & 4 & 4 & 4 & 4 & 4 & 4 & 4 & 4 \end{array}$$

$$\begin{array}{cccccccccccc} 5 & 6 & 7 & 8 & 9 & 10 & 11 & 12 & 13 & 14 \\ \hline 5 & 5 & 5 & 5 & 5 & 5 & 5 & 5 & 5 & 5 \end{array}$$

$$\begin{array}{cccccccccccc} 6 & 7 & 8 & 9 & 10 & 11 & 12 & 13 & 14 & 15 \\ \hline 6 & 6 & 6 & 6 & 6 & 6 & 6 & 6 & 6 & 6 \end{array}$$

$$\begin{array}{cccccccccccc} 7 & 8 & 9 & 10 & 11 & 12 & 13 & 14 & 15 & 16 \\ \hline 7 & 7 & 7 & 7 & 7 & 7 & 7 & 7 & 7 & 7 \end{array}$$

$$\begin{array}{cccccccccccc} 8 & 9 & 10 & 11 & 12 & 13 & 14 & 15 & 16 & 17 \\ \hline 8 & 8 & 8 & 8 & 8 & 8 & 8 & 8 & 8 & 8 \end{array}$$

$$\begin{array}{cccccccccccc} 9 & 10 & 11 & 12 & 13 & 14 & 15 & 16 & 17 & 18 \\ \hline 9 & 9 & 9 & 9 & 9 & 9 & 9 & 9 & 9 & 9 \end{array}$$

As in addition every device should be used to enable the students to memorize these basic facts, such as flash cards, drill (a few minutes each day), and mimeographed copies of these facts. Reproduce the chart below on the blackboard and have the students subtract the numbers in the left-hand column from the numbers across the top.

	11	13	10	12	13	11	17	15	16
3									
4									
6									
8									
5									
7									

B. Method of Subtracting (No Borrowing)

The same principles which apply to addition (no carrying) apply to subtraction (no borrowing). We go back to the meaning of the number system as explained in Unit I. We are again employing place value.

Example:

$$\begin{array}{r} 76 = 7 \text{ tens} + 6 \text{ ones} \\ - 24 = 2 \text{ tens} + 4 \text{ ones} \\ \hline 5 \text{ tens} + 2 \text{ ones} \\ \text{or } 50 + 2 = 52 \end{array}$$

How many of these examples are necessary depends on the ability of the group. If more examples are needed, use the following:

$\begin{array}{r} 87 = 8 \text{ tens} + 7 \text{ ones} \\ - 15 = 1 \text{ ten} + 5 \text{ ones} \\ \hline 7 \text{ tens} + 2 \text{ ones} \\ \text{or } 70 + 2 = 72 \end{array}$	$\begin{array}{r} 49 = 4 \text{ tens} + 9 \text{ ones} \\ - 37 = 3 \text{ tens} + 7 \text{ ones} \\ \hline 1 \text{ ten} + 2 \text{ ones} \\ \text{or } 10 + 2 = 12 \end{array}$
--	--

Further practice can be extended to the hundreds place.

$$\begin{array}{r} 768 = 7 \text{ hundreds} + 6 \text{ tens} + 8 \text{ ones} \\ - 417 = 4 \text{ hundreds} + 1 \text{ ten} + 7 \text{ ones} \\ \hline 3 \text{ hundreds} + 5 \text{ tens} + 1 \text{ one} \\ \text{or } 300 + 50 + 1 = 351 \end{array}$$

In subtraction caution students to do the following:

1. Write the smaller number under the larger number.
2. Write the ones under ones, the tens under tens, etc.
3. Begin at the right subtracting the ones first, then the tens, etc.

Do the following problems on the blackboard the short way before students start Assignment 12.

$\begin{array}{r} 78 \\ - 37 \\ \hline \end{array}$	$\begin{array}{r} 93 \\ - 71 \\ \hline \end{array}$	$\begin{array}{r} 267 \\ - 134 \\ \hline \end{array}$	$\begin{array}{r} 982 \\ - 671 \\ \hline \end{array}$
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C. Word Problems (No Borrowing)

(TEACHING SUGGESTIONS FOR ASSIGNMENT 13)

The same suggestions made in Unit II on solving word problems in addition also apply to subtraction. Briefly they are:

1. Read the problem carefully.
2. Decide what facts are given.
3. Decide what you are to find.
4. Decide what operation to perform.
5. Do the necessary computation.

In step number four to assist in deciding whether or not to subtract, the following words or expressions indicate subtraction:

1. How many are left
2. How many fewer
3. The difference
4. How much more or less

Probably of more importance than the memorizing of these key words or expressions is a knowledge of the meaning of addition and subtraction; whether groups are to be brought together (addition) or separated (subtraction). Knowing the meaning of these operations assists in becoming proficient in solving word problems.

$$\begin{array}{r} 200 \\ 170 \\ \hline 30 \end{array} \quad \begin{array}{r} 200 \\ 180 \\ \hline 20 \end{array} \quad \begin{array}{r} 20 \\ 15 \\ \hline 5 \end{array} \quad \begin{array}{r} 20 \\ 12 \\ \hline 8 \end{array}$$

ASSIGNMENT 12

Subtract:

$$\begin{array}{r} 1) \quad 56 \\ \quad 24 \\ \hline \end{array} \quad \begin{array}{r} 2) \quad 46 \\ \quad 25 \\ \hline \end{array} \quad \begin{array}{r} 3) \quad 25 \\ \quad 12 \\ \hline \end{array} \quad \begin{array}{r} 4) \quad 48 \\ \quad 16 \\ \hline \end{array}$$

$$\begin{array}{r} 5) \quad 85 \\ \quad 51 \\ \hline \end{array} \quad \begin{array}{r} 6) \quad 97 \\ \quad 42 \\ \hline \end{array} \quad \begin{array}{r} 7) \quad 335 \\ \quad 214 \\ \hline \end{array} \quad \begin{array}{r} 8) \quad 455 \\ \quad 323 \\ \hline \end{array}$$

$$\begin{array}{r} 9) \quad 694 \\ \quad 363 \\ \hline \end{array} \quad \begin{array}{r} 10) \quad 984 \\ \quad 372 \\ \hline \end{array} \quad \begin{array}{r} 11) \quad 456 \\ \quad 122 \\ \hline \end{array} \quad \begin{array}{r} 12) \quad 782 \\ \quad 231 \\ \hline \end{array}$$

$$\begin{array}{r} 13) \quad 956 \\ \quad 432 \\ \hline \end{array} \quad \begin{array}{r} 14) \quad 677 \\ \quad 143 \\ \hline \end{array} \quad \begin{array}{r} 15) \quad 967 \\ \quad 125 \\ \hline \end{array} \quad \begin{array}{r} 16) \quad 296 \\ \quad 175 \\ \hline \end{array}$$

$$\begin{array}{r} 17) \quad 247 \\ \quad 125 \\ \hline \end{array} \quad \begin{array}{r} 18) \quad 598 \\ \quad 172 \\ \hline \end{array} \quad \begin{array}{r} 19) \quad 569 \\ \quad 328 \\ \hline \end{array} \quad \begin{array}{r} 20) \quad 7,846 \\ \quad 3,525 \\ \hline \end{array}$$

$$\begin{array}{r} 21) \quad 9,422 \\ \quad 5,211 \\ \hline \end{array} \quad \begin{array}{r} 22) \quad 6,779 \\ \quad 2,458 \\ \hline \end{array} \quad \begin{array}{r} 23) \quad 78,293 \\ \quad 56,172 \\ \hline \end{array} \quad \begin{array}{r} 24) \quad 98,477 \\ \quad 63,255 \\ \hline \end{array}$$

$$\begin{array}{r} 25) \quad 63,487 \\ \quad 41,266 \\ \hline \end{array} \quad \begin{array}{r} 26) \quad 26,948 \\ \quad 15,615 \\ \hline \end{array} \quad \begin{array}{r} 27) \quad 99,898 \\ \quad 37,284 \\ \hline \end{array} \quad \begin{array}{r} 28) \quad 79,653 \\ \quad 37,422 \\ \hline \end{array}$$

29) From each of these numbers,

68 45 86 97

subtract:

a. 23 31 14 42

b. 34 13 41 22

Copy and subtract:

$$30) \quad 64 - 31$$

$$31) \quad 495 - 232$$

ASSIGNMENT 13

1. Mary wants to send 27 post cards from the airport. She has only 16 stamps. How many more stamps does she need?
2. A truck with a load of coal weighs 8,742 pounds. The coal weighs 4,321 pounds. How much does the truck weigh?
3. The speedometer on John's bike showed 3,258 miles at the beginning of his vacation. When his vacation was over, it read 3,369 miles. How many miles did he ride during his vacation?
4. The tallest boy in Grade 9B was 74 inches tall. The shortest boy was 61 inches tall. What was the difference in their heights?
5. John is up to page 238 in his history book. There are 469 pages in the book. How many more pages does he have left to read?
6. A chocolate milk shake has 385 calories. A hamburger has 250 calories. How many more calories has a chocolate milk shake than a hamburger has?
7. It is 985 miles from Chicago to Boston and 831 miles from Chicago to New York. How much greater is the distance from Chicago to Boston than the distance from Chicago to New York?
8. A used-car lot had 58 cars at the beginning of the month. If 23 cars were sold during the month, how many cars were left at the end of the month?
9. At Hyde Park High School there are 2,856 students. The enrollment at Hirsch High School is 1,633 students. How many more students are there at Hyde Park than are at Hirsch?

D. Money and Zero

(TEACHING SUGGESTIONS FOR ASSIGNMENT 14)

The same rules that apply in addition with respect to dollar signs and decimal points apply to subtraction. The following should be emphasized:

1. Keep decimal point under decimal point.
2. Answers should have a dollar sign and decimal point.

Place the following problems on the blackboard for illustration:

$$\begin{array}{r} \$8.95 \\ \underline{7.52} \end{array} \quad \begin{array}{r} \$28.57 \\ \underline{16.34} \end{array} \quad \begin{array}{r} \$97.86 \\ \underline{34.52} \end{array} \quad \begin{array}{r} \$576.49 \\ \underline{235.26} \end{array}$$

Zeros in subtraction serve the same purpose as they do in addition.

These functions are:

1. To serve as a place holder
2. To indicate nothing, or not any

Explain the following principles about zero:

1. Any number from itself leaves zero.

$$\begin{array}{r} 85 \\ \underline{35} \end{array} \quad \begin{array}{r} 92 \\ \underline{32} \end{array} \quad \begin{array}{r} 568 \\ \underline{362} \end{array} \quad \begin{array}{r} 975 \\ \underline{371} \end{array} \quad \begin{array}{r} 433 \\ \underline{283} \end{array} \quad \begin{array}{r} \$973 \\ \underline{273} \end{array} \quad \begin{array}{r} \$3.47 \\ \underline{3.27} \end{array} \quad \begin{array}{r} \$7.23 \\ \underline{2.21} \end{array}$$

2. Zero from any number leaves the number.

$$\begin{array}{r} 749 \\ \underline{520} \end{array} \quad \begin{array}{r} 972 \\ \underline{650} \end{array} \quad \begin{array}{r} 983 \\ \underline{680} \end{array} \quad \begin{array}{r} 263 \\ \underline{102} \end{array} \quad \begin{array}{r} 800 \\ \underline{200} \end{array} \quad \begin{array}{r} \$900 \\ \underline{600} \end{array} \quad \begin{array}{r} \$7.28 \\ \underline{5.10} \end{array} \quad \begin{array}{r} \$47.63 \\ \underline{20.62} \end{array}$$

There are cases where it is not necessary to write the zeros.

Examples:

$$\begin{array}{r} 75 \\ \underline{72} \\ 3 \end{array} \quad \begin{array}{r} 848 \\ \underline{843} \\ 5 \end{array}$$

In these examples the zeros are not needed because there is no place to hold.

E. Meaning of Borrowing

(TEACHING SUGGESTIONS FOR ASSIGNMENT 15)

In order for borrowing to be a successful operation, meaning must be involved. If borrowing becomes a rote-memorization process, then the student eventually will have trouble with whole numbers and will also have trouble with fractions and decimals.

There are two questions to be answered in borrowing:

1. Why borrow?
2. What to borrow?

In answer to the first question:

We borrow because we have to borrow. If you have enough money to pay your bills, you do not borrow money. If you do not have enough money to pay your bills, you borrow money.

In answer to the second question:

You borrow what you need. If you need money, you borrow money.

If you need flour to bake a cake, you borrow flour.

Borrowing is the same, whether it is money, flour, whole numbers, fractions, or decimals.

Before explaining borrowing go over the long method of subtracting with this example:

$$\begin{array}{r}
 76 = 7 \text{ tens} + 6 \text{ ones} \\
 - 24 = 2 \text{ tens} + 4 \text{ ones} \\
 \hline
 5 \text{ tens} + 2 \text{ ones} \\
 \text{or } 50 + 2 = 52
 \end{array}$$

Now present this problem:

$$\begin{array}{r}
 74 = 7 \text{ tens} + 4 \text{ ones} = 6 \text{ tens} + 14 \text{ ones} \\
 - 26 = 2 \text{ tens} + 6 \text{ ones} = 2 \text{ tens} + 6 \text{ ones} \\
 \hline
 4 \text{ tens} + 8 \text{ ones} \\
 \text{or } 40 + 8 = 48
 \end{array}$$

Explanation:

In this problem we cannot subtract because we do not have enough ones (we borrow because we have to borrow). We borrow from the next unit which is tens. We borrow 1 ten from 7 tens and change the 1 ten to 10 ones (we borrow what we need). The 4 ones plus the 10 ones makes 14 ones. Now we can subtract.

Do several more examples on the blackboard.

$$\begin{array}{r} 42 \\ -28 \\ \hline \end{array}$$

$$\begin{array}{r} 53 \\ -19 \\ \hline \end{array}$$

$$\begin{array}{r} 91 \\ -65 \\ \hline \end{array}$$

This can be extended to borrowing in hundreds.

$$\begin{array}{r} 748 = 7 \text{ hundreds} + 4 \text{ tens} + 8 \text{ ones} = 6 \text{ hundreds} + 14 \text{ tens} + 8 \text{ ones} \\ -362 = 3 \text{ hundreds} + 6 \text{ tens} + 2 \text{ ones} = 3 \text{ hundreds} + 6 \text{ tens} + 2 \text{ ones} \\ \hline 3 \text{ hundreds} + 8 \text{ tens} + 6 \text{ ones} \\ \text{or } 300 + 80 + 6 = 386 \end{array}$$

Other examples:

$$\begin{array}{r} 659 \\ -283 \\ \hline \end{array}$$

$$\begin{array}{r} 423 \\ -291 \\ \hline \end{array}$$

If necessary, another approach to the explanation of borrowing may be the following:

Subtract 28¢ from 62¢.

$$\begin{array}{r} 62¢ = 6 \text{ dimes} + 2 \text{ pennies} = 5 \text{ dimes} + 12 \text{ pennies} \\ -28¢ = 2 \text{ dimes} + 8 \text{ pennies} = 2 \text{ dimes} + 8 \text{ pennies} \\ \hline 3 \text{ dimes} + 4 \text{ pennies} \\ \text{or } 30¢ + 4¢ = 34¢ \end{array}$$

Explanation:

Break each amount into dimes and pennies. You cannot subtract 8 pennies from 2 pennies so you borrow 1 dime. Change the 1 dime to 10 pennies. Two pennies plus 10 pennies makes 12 pennies.

F. Borrowing in Numerical Problems

(TEACHING SUGGESTIONS FOR ASSIGNMENT 16)

Assignment 15 was intended to give meaning to the process of borrowing. It is obvious that it is not practical to continue with this long method of borrowing. Use the examples from Assignment 15 to show the short method.

$$\begin{array}{r} 4\ 13 \\ \cancel{3} \\ -27 \\ \hline \end{array}$$

Explanation:

Note in this example that the 3 is crossed out and is replaced by the 13. Writing the 13 above the 3 emphasizes the meaning more than just writing a one in front of the 3. The 3 has been replaced by the 13.

Do the following examples on the blackboard in the same manner:

$$\begin{array}{r} 8\ 15 \\ \cancel{3} \\ -45 \\ \hline \end{array}$$

$$\begin{array}{r} 7\ 14 \\ \cancel{4} \\ -29 \\ \hline \end{array}$$

$$\begin{array}{r} 4\ 11 \\ \cancel{7} \\ -22 \\ \hline \end{array}$$

Extend this process to include hundreds:

$$\begin{array}{r} 6\ 12 \\ \cancel{7} \\ -352 \\ \hline \end{array}$$

$$\begin{array}{r} 5\ 14 \\ \cancel{4} \\ -281 \\ \hline \end{array}$$

$$\begin{array}{r} 6\ 11 \\ \cancel{7} \\ -125 \\ \hline \end{array}$$

ASSIGNMENT 14

Subtract:

$$\begin{array}{r} 1) \quad \$.95 \\ \quad \underline{.23} \end{array}$$

$$\begin{array}{r} 2) \quad \$9.45 \\ \quad \underline{8.23} \end{array}$$

$$\begin{array}{r} 3) \quad \$.98 \\ \quad \underline{.25} \end{array}$$

$$\begin{array}{r} 4) \quad \$6.78 \\ \quad \underline{3.34} \end{array}$$

$$\begin{array}{r} 5) \quad \$8.85 \\ \quad \underline{4.24} \end{array}$$

$$\begin{array}{r} 6) \quad \$.97 \\ \quad \underline{.53} \end{array}$$

$$\begin{array}{r} 7) \quad \$1.75 \\ \quad \underline{.43} \end{array}$$

$$\begin{array}{r} 8) \quad \$9.79 \\ \quad \underline{3.25} \end{array}$$

$$\begin{array}{r} 9) \quad \$247.93 \\ \quad \underline{135.72} \end{array}$$

$$\begin{array}{r} 10) \quad \$598.64 \\ \quad \underline{262.34} \end{array}$$

$$\begin{array}{r} 11) \quad 80 \\ \quad \underline{80} \end{array}$$

$$\begin{array}{r} 12) \quad 249 \\ \quad \underline{210} \end{array}$$

$$\begin{array}{r} 13) \quad 308 \\ \quad \underline{104} \end{array}$$

$$\begin{array}{r} 14) \quad 209 \\ \quad \underline{205} \end{array}$$

$$\begin{array}{r} 15) \quad 24 \\ \quad \underline{22} \end{array}$$

$$\begin{array}{r} 16) \quad 50 \\ \quad \underline{20} \end{array}$$

$$\begin{array}{r} 17) \quad 46 \\ \quad \underline{26} \end{array}$$

$$\begin{array}{r} 18) \quad 49 \\ \quad \underline{30} \end{array}$$

$$\begin{array}{r} 19) \quad 78 \\ \quad \underline{18} \end{array}$$

$$\begin{array}{r} 20) \quad 125 \\ \quad \underline{25} \end{array}$$

$$\begin{array}{r} 21) \quad 37 \\ \quad \underline{7} \end{array}$$

$$\begin{array}{r} 22) \quad 45 \\ \quad \underline{5} \end{array}$$

$$\begin{array}{r} 23) \quad 72 \\ \quad \underline{2} \end{array}$$

$$\begin{array}{r} 24) \quad 316 \\ \quad \underline{12} \end{array}$$

$$\begin{array}{r} 25) \quad 500 \\ \quad \underline{200} \end{array}$$

$$\begin{array}{r} 26) \quad 205 \\ \quad \underline{105} \end{array}$$

$$\begin{array}{r} 27) \quad 583 \\ \quad \underline{470} \end{array}$$

$$\begin{array}{r} 28) \quad 708 \\ \quad \underline{606} \end{array}$$

$$\begin{array}{r} 29) \quad 750 \\ \quad \underline{350} \end{array}$$

$$\begin{array}{r} 30) \quad 248 \\ \quad \underline{8} \end{array}$$

$$\begin{array}{r} 31) \quad 436 \\ \quad \underline{136} \end{array}$$

$$\begin{array}{r} 32) \quad 430 \\ \quad \underline{100} \end{array}$$

$$\begin{array}{r} 33) \quad 421 \\ \quad \underline{220} \end{array}$$

$$\begin{array}{r} 34) \quad 96 \\ \quad \underline{16} \end{array}$$

$$\begin{array}{r} 35) \quad 349 \\ \quad \underline{336} \end{array}$$

$$\begin{array}{r} 36) \quad 788 \\ \quad \underline{85} \end{array}$$

$$\begin{array}{r} 37) \quad 892 \\ \quad \underline{52} \end{array}$$

$$\begin{array}{r} 38) \quad 168 \\ \quad \underline{61} \end{array}$$

$$\begin{array}{r} 39) \quad 93 \\ \quad \underline{63} \end{array}$$

$$\begin{array}{r} 40) \quad 57 \\ \quad \underline{50} \end{array}$$

$$\begin{array}{r} 41) \quad 148 \\ \quad \underline{30} \end{array}$$

$$\begin{array}{r} 42) \quad 890 \\ \quad \underline{350} \end{array}$$

$$\begin{array}{r} 43) \quad 809 \\ \quad \underline{401} \end{array}$$

$$\begin{array}{r} 44) \quad \$.67 \\ \quad \underline{.20} \end{array}$$

$$\begin{array}{r} 45) \quad \$.09 \\ \quad \underline{.06} \end{array}$$

$$\begin{array}{r} 46) \quad \$1.72 \\ \quad \underline{.02} \end{array}$$

$$\begin{array}{r} 47) \quad \$2.08 \\ \quad \underline{.01} \end{array}$$

$$\begin{array}{r} 48) \quad \$8.70 \\ \quad \underline{2.70} \end{array}$$

$$\begin{array}{r} 49) \quad \$6.50 \\ \quad \underline{3.30} \end{array}$$

$$\begin{array}{r} 50) \quad \$237.56 \\ \quad \underline{137.53} \end{array}$$

ASSIGNMENT 15

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Subtract the long way. Numbers 1 and 4 have been done for you.

$$\begin{array}{r}
 1) \quad 53 = 5 \text{ tens} + 3 \text{ ones} = 4 \text{ tens} + 13 \text{ ones} \\
 -27 = 2 \text{ tens} + 7 \text{ ones} = 2 \text{ tens} + 7 \text{ ones} \\
 \hline
 2 \text{ tens} + 6 \text{ ones} \\
 \text{or} \quad 20 + 6 = 26
 \end{array}$$

$$\begin{array}{r}
 2) \quad 95 \\
 -46 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 3) \quad 84 \\
 -29 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 4) \quad 728 = 7 \text{ hundreds} + 2 \text{ tens} + 8 \text{ ones} = 6 \text{ hundreds} + 12 \text{ tens} + 8 \text{ ones} \\
 -352 = 3 \text{ hundreds} + 5 \text{ tens} + 2 \text{ ones} = 3 \text{ hundreds} + 5 \text{ tens} + 2 \text{ ones} \\
 \hline
 3 \text{ hundreds} + 7 \text{ tens} + 6 \text{ ones} \\
 \text{or} \quad 300 + 70 + 6 = 376
 \end{array}$$

$$\begin{array}{r}
 5) \quad 643 \\
 -281 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 6) \quad 718 \\
 -125 \\
 \hline
 \end{array}$$

ASSIGNMENT 16

Subtract:

$$\begin{array}{r}
 1) \quad 82 \\
 -49 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 2) \quad 97 \\
 -18 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 3) \quad 444 \\
 -219 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 4) \quad 577 \\
 -138 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 5) \quad 6251 \\
 -2143 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 6) \quad 266 \\
 -147 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 7) \quad 365 \\
 -274 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 8) \quad 538 \\
 -446 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 9) \quad 721 \\
 -351 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 10) \quad 850 \\
 -760 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 11) \quad 916 \\
 -80 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 12) \quad 677 \\
 -92 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 13) \quad 83 \\
 -7 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 14) \quad 75 \\
 -19 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 15) \quad 6267 \\
 -58 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 16) \quad 9527 \\
 -3482 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 17) \quad 7942 \\
 -3617 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 18) \quad 3382 \\
 -1249 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 19) \quad 4732 \\
 -2586 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 20) \quad 9681 \\
 -3599 \\
 \hline
 \end{array}$$

21) Cross out the wrong numbers in the answers below:

$$\begin{array}{r}
 \text{a.} \quad 174 \\
 -68 \\
 \hline
 116
 \end{array}$$

$$\begin{array}{r}
 \text{b.} \quad 743 \\
 -219 \\
 \hline
 534
 \end{array}$$

$$\begin{array}{r}
 \text{c.} \quad 621 \\
 -413 \\
 \hline
 208
 \end{array}$$

$$\begin{array}{r}
 \text{d.} \quad 621 \\
 -219 \\
 \hline
 412
 \end{array}$$

22) Copy and subtract:

$$\text{a.} \quad 1876 - 59$$

$$\text{d.} \quad 7791 - 358$$

$$\text{b.} \quad 3452 - 14$$

$$\text{e.} \quad 2245 - 216$$

$$\text{c.} \quad 6537 - 118$$

$$\text{f.} \quad 9374 - 92$$

G. Borrowing Both Tens and Hundreds

(TEACHING SUGGESTIONS FOR ASSIGNMENT 17)

Subtraction is extended now to include borrowing from both tens and hundreds. Place the following examples on the blackboard.

$$\begin{array}{r}
 733 = \overset{6}{7} \text{ hundreds} + \overset{12}{8} \text{ tens} + \overset{13}{9} \text{ ones} \\
 -567 = 5 \text{ hundreds} + 6 \text{ tens} + 7 \text{ ones} \\
 \hline
 1 \text{ hundred} + 6 \text{ tens} + 6 \text{ ones} \\
 \text{or } 100 + 60 + 6 = 166
 \end{array}$$

Explain each step carefully in order to put meaning into borrowing both tens and hundreds. Several more examples will help.

$$\begin{array}{r}
 652 \\
 -279 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 957 \\
 -289 \\
 \hline
 \end{array}$$

Work the three problems above the short way.

$$\begin{array}{r}
 61213 \\
 788 \\
 -567 \\
 \hline
 166
 \end{array}$$

$$\begin{array}{r}
 5412 \\
 882 \\
 -279 \\
 \hline
 373
 \end{array}$$

$$\begin{array}{r}
 41417 \\
 558 \\
 -289 \\
 \hline
 268
 \end{array}$$

To extend borrowing to thousands and ten thousands involves no problem if the student understands the previous explanation.

No attempt should be made to break down the numbers and work out the problems by the long method. Place the following problems on the board and work them out carefully.

$$\begin{array}{r}
 614 \\
 7179 \\
 -3867 \\
 \hline
 3612
 \end{array}$$

$$\begin{array}{r}
 615 \\
 7884 \\
 -2732 \\
 \hline
 4852
 \end{array}$$

$$\begin{array}{r}
 51315 \\
 8487 \\
 -4596 \\
 \hline
 1861
 \end{array}$$

$$\begin{array}{r}
 312116 \\
 1328 \\
 -2759 \\
 \hline
 1567
 \end{array}$$

H. Borrowing; Zeros

(TEACHING SUGGESTIONS FOR ASSIGNMENT 18)

Zeros are a source of many errors in subtraction. Many of these errors are due to a lack of understanding of the function of zero as a place holder. Start the examples with a zero in the ones place and increase the number of zeros. Place the following example on the blackboard:

$$\begin{array}{r} 70 = 7 \text{ tens} + 0 \text{ ones} = 6 \text{ tens} + 10 \text{ ones} \\ -37 = 3 \text{ tens} + 7 \text{ ones} = 3 \text{ tens} + 7 \text{ ones} \\ \hline \end{array}$$

$$\begin{array}{r} 3 \text{ tens} + 3 \text{ ones} \\ \text{or } 30 + 3 = 33 \end{array}$$

Explanation: You cannot subtract 7 ones from 0 ones.

Borrow 1 ten and change it to 10 ones.

0 ones plus ten ones makes 10 ones.

Do several more examples:

$$\begin{array}{r} 90 = \\ -46 = \end{array} \quad \begin{array}{r} 30 = \\ -19 = \end{array}$$

Extend this to include hundreds:

$$\begin{array}{r} 700 = 7 \text{ hundreds} + 0 \text{ tens} + 0 \text{ ones} \\ -252 = 2 \text{ hundreds} + 5 \text{ tens} + 2 \text{ ones} \\ \hline \end{array}$$

$$\begin{array}{r} 4 \text{ hundreds} + 4 \text{ tens} + 8 \text{ ones} \\ \text{or } 400 + 40 + 8 = 448 \end{array}$$

Further expansion is not necessary. Teach the short form before students start Assignment 18.

$$\begin{array}{r} 6 \text{ } 10 \\ 70 \\ -37 \\ \hline \end{array}$$

$$\begin{array}{r} 8 \text{ } 10 \\ 90 \\ -46 \\ \hline \end{array}$$

$$\begin{array}{r} 2 \text{ } 10 \\ 30 \\ -19 \\ \hline \end{array}$$

$$\begin{array}{r} 9 \\ 6 \text{ } 10 \\ 700 \\ -252 \\ \hline \end{array}$$

$$\begin{array}{r} 9 \\ 8 \text{ } 10 \\ 900 \\ -578 \\ \hline \end{array}$$

I. Borrowing; Money Problems

(TEACHING SUGGESTIONS FOR ASSIGNMENT 19)

You can teach the process of borrowing in dollars and cents the same as you would for whole numbers.

Example: $\$7.83$

$- 2.49$

$\$7.83$

$- 2.49$

$\$5.34$

If you want to put meaning into the process, then you can break the amounts of money into pennies, dimes and dollars.

$$\begin{aligned} \$7.83 &= 7 \text{ dollars} + 8 \text{ dimes} + 3 \text{ pennies} = 7 \text{ dollars} + 7 \text{ dimes} + 13 \text{ pennies} \\ - 2.49 &= 2 \text{ dollars} + 4 \text{ dimes} + 9 \text{ pennies} = 2 \text{ dollars} + 4 \text{ dimes} + 9 \text{ pennies} \\ \hline &5 \text{ dollars} + 3 \text{ dimes} + 4 \text{ pennies} \\ &\text{or } 5 \text{ dollars} + 30\phi + 4\phi = \$5.34 \end{aligned}$$

Explanation: You cannot subtract 9 pennies from 3 pennies

Borrow 1 dime and change it to 10 pennies

10 pennies plus 3 pennies = 13 pennies

Caution students about dollar signs and decimal points.

J. Word Problems

(TEACHING SUGGESTIONS FOR ASSIGNMENT 20)

Before doing Assignment 20 go over the suggestions in Part C, page 21D of this unit and review the solution of word problems in subtraction.

K. Review of Addition and Subtraction

(TEACHING SUGGESTIONS FOR ASSIGNMENT 21)

The students in Basic Mathematics need a considerable amount of review work as the unit progresses. The numerical problems in Assignment 21 are mixed so the student has to be careful to perform the correct operation. Be sure the student understands what the sign indicates.

The word problems also involve mixed operations. In some of the word problems it is necessary to do both addition and subtraction.

L. Activities

(TEACHING SUGGESTIONS FOR ASSIGNMENT 22)

The problems in Assignment 22 afford more opportunity for review of addition and subtraction.

In working the magic square problems the student will have to find one row or column that has all three numbers in it and add them. All other rows and columns must have the same sum.

ASSIGNMENT 17

Subtract:

$$\begin{array}{r} 1) \quad 736 \\ \underline{248} \end{array} \quad \begin{array}{r} 2) \quad 573 \\ \underline{377} \end{array} \quad \begin{array}{r} 3) \quad 225 \\ \underline{126} \end{array} \quad \begin{array}{r} 4) \quad 348 \\ \underline{249} \end{array} \quad \begin{array}{r} 5) \quad 465 \\ \underline{376} \end{array}$$

$$\begin{array}{r} 6) \quad 652 \\ \underline{453} \end{array} \quad \begin{array}{r} 7) \quad 641 \\ \underline{287} \end{array} \quad \begin{array}{r} 8) \quad 952 \\ \underline{189} \end{array} \quad \begin{array}{r} 9) \quad 934 \\ \underline{375} \end{array} \quad \begin{array}{r} 10) \quad 821 \\ \underline{589} \end{array}$$

$$\begin{array}{r} 11) \quad 638 \\ \underline{379} \end{array} \quad \begin{array}{r} 12) \quad 7,985 \\ \underline{5,496} \end{array} \quad \begin{array}{r} 13) \quad 9,652 \\ \underline{3,267} \end{array} \quad \begin{array}{r} 14) \quad 49,624 \\ \underline{23,275} \end{array} \quad \begin{array}{r} 15) \quad 56,863 \\ \underline{27,674} \end{array}$$

$$\begin{array}{r} 16) \quad 8,753 \\ \underline{2,932} \end{array} \quad \begin{array}{r} 17) \quad 7,394 \\ \underline{2,563} \end{array} \quad \begin{array}{r} 18) \quad 9,592 \\ \underline{2,942} \end{array} \quad \begin{array}{r} 19) \quad 6,475 \\ \underline{2,942} \end{array} \quad \begin{array}{r} 20) \quad 9,748 \\ \underline{3,916} \end{array}$$

$$\begin{array}{r} 21) \quad 6,352 \\ \underline{2,617} \end{array} \quad \begin{array}{r} 22) \quad 9,737 \\ \underline{2,985} \end{array} \quad \begin{array}{r} 23) \quad 7,365 \\ \underline{4,584} \end{array} \quad \begin{array}{r} 24) \quad 5,689 \\ \underline{2,997} \end{array} \quad \begin{array}{r} 25) \quad 3,776 \\ \underline{1,785} \end{array}$$

$$\begin{array}{r} 26) \quad 8,864 \\ \underline{6,975} \end{array} \quad \begin{array}{r} 27) \quad 8,435 \\ \underline{2,479} \end{array} \quad \begin{array}{r} 28) \quad 8,368 \\ \underline{2,579} \end{array} \quad \begin{array}{r} 29) \quad 6,248 \\ \underline{3,359} \end{array} \quad \begin{array}{r} 30) \quad 7,885 \\ \underline{5,996} \end{array}$$

$$\begin{array}{r} 31) \quad 9,163 \\ \underline{4,527} \end{array} \quad \begin{array}{r} 32) \quad 4,368 \\ \underline{2,729} \end{array} \quad \begin{array}{r} 33) \quad 7,694 \\ \underline{6,975} \end{array} \quad \begin{array}{r} 34) \quad 6,923 \\ \underline{3,592} \end{array} \quad \begin{array}{r} 35) \quad 8,972 \\ \underline{5,784} \end{array}$$

$$\begin{array}{r} 36) \quad 52,346 \\ \underline{23,898} \end{array} \quad \begin{array}{r} 37) \quad 71,932 \\ \underline{52,446} \end{array} \quad \begin{array}{r} 38) \quad 45,687 \\ \underline{9,643} \end{array} \quad \begin{array}{r} 39) \quad 84,457 \\ \underline{7,368} \end{array} \quad \begin{array}{r} 40) \quad 13,678 \\ \underline{9,959} \end{array}$$

$$\begin{array}{r} 41) \quad 15,969 \\ \underline{6,898} \end{array} \quad \begin{array}{r} 42) \quad 51,362 \\ \underline{39,979} \end{array} \quad \begin{array}{r} 43) \quad 32,958 \\ \underline{9,789} \end{array} \quad \begin{array}{r} 44) \quad 32,415 \\ \underline{19,723} \end{array} \quad \begin{array}{r} 45) \quad 92,783 \\ \underline{997} \end{array}$$

46) Copy and subtract:

$$a. \quad 729 - 38 \quad c. \quad 9,662 - 78 \quad e. \quad 98,123 - 4,976$$

$$b. \quad 4,728 - 949 \quad d. \quad 27,236 - 79 \quad f. \quad 62,521 - 9,635$$

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ASSIGNMENT 18

Subtract:

- 1) $\begin{array}{r} 70 \\ -38 \\ \hline \end{array}$ 2) $\begin{array}{r} 80 \\ -54 \\ \hline \end{array}$ 3) $\begin{array}{r} 70 \\ -19 \\ \hline \end{array}$ 4) $\begin{array}{r} 90 \\ -63 \\ \hline \end{array}$ 5) $\begin{array}{r} 60 \\ -56 \\ \hline \end{array}$ 6) $\begin{array}{r} 40 \\ -31 \\ \hline \end{array}$ 7) $\begin{array}{r} 90 \\ -7 \\ \hline \end{array}$
- 8) $\begin{array}{r} 50 \\ -3 \\ \hline \end{array}$ 9) $\begin{array}{r} 20 \\ -8 \\ \hline \end{array}$ 10) $\begin{array}{r} 30 \\ -2 \\ \hline \end{array}$ 11) $\begin{array}{r} 590 \\ -355 \\ \hline \end{array}$ 12) $\begin{array}{r} 970 \\ -447 \\ \hline \end{array}$ 13) $\begin{array}{r} 770 \\ -263 \\ \hline \end{array}$ 14) $\begin{array}{r} 930 \\ -445 \\ \hline \end{array}$
- 15) $\begin{array}{r} 990 \\ -483 \\ \hline \end{array}$ 16) $\begin{array}{r} 430 \\ -229 \\ \hline \end{array}$ 17) $\begin{array}{r} 750 \\ -462 \\ \hline \end{array}$ 18) $\begin{array}{r} 908 \\ -472 \\ \hline \end{array}$ 19) $\begin{array}{r} 406 \\ -235 \\ \hline \end{array}$ 20) $\begin{array}{r} 909 \\ -678 \\ \hline \end{array}$ 21) $\begin{array}{r} 430 \\ -227 \\ \hline \end{array}$
- 22) $\begin{array}{r} 910 \\ -606 \\ \hline \end{array}$ 23) $\begin{array}{r} 410 \\ -209 \\ \hline \end{array}$ 24) $\begin{array}{r} 703 \\ -362 \\ \hline \end{array}$ 25) $\begin{array}{r} 809 \\ -347 \\ \hline \end{array}$ 26) $\begin{array}{r} 303 \\ -272 \\ \hline \end{array}$ 27) $\begin{array}{r} 608 \\ -466 \\ \hline \end{array}$ 28) $\begin{array}{r} 806 \\ -340 \\ \hline \end{array}$
- 29) $\begin{array}{r} 903 \\ -793 \\ \hline \end{array}$ 30) $\begin{array}{r} 505 \\ -325 \\ \hline \end{array}$ 31) $\begin{array}{r} 901 \\ -651 \\ \hline \end{array}$ 32) $\begin{array}{r} 907 \\ -857 \\ \hline \end{array}$ 33) $\begin{array}{r} 409 \\ -279 \\ \hline \end{array}$ 34) $\begin{array}{r} 840 \\ -367 \\ \hline \end{array}$ 35) $\begin{array}{r} 570 \\ -394 \\ \hline \end{array}$
- 36) $\begin{array}{r} 803 \\ -574 \\ \hline \end{array}$ 37) $\begin{array}{r} 905 \\ -487 \\ \hline \end{array}$ 38) $\begin{array}{r} 601 \\ -56 \\ \hline \end{array}$ 39) $\begin{array}{r} 807 \\ -39 \\ \hline \end{array}$ 40) $\begin{array}{r} 702 \\ -96 \\ \hline \end{array}$ 41) $\begin{array}{r} 700 \\ -638 \\ \hline \end{array}$ 42) $\begin{array}{r} 300 \\ -184 \\ \hline \end{array}$
- 43) $\begin{array}{r} 900 \\ -655 \\ \hline \end{array}$ 44) $\begin{array}{r} 800 \\ -346 \\ \hline \end{array}$ 45) $\begin{array}{r} 400 \\ -76 \\ \hline \end{array}$ 46) $\begin{array}{r} 200 \\ -94 \\ \hline \end{array}$ 47) $\begin{array}{r} 600 \\ -49 \\ \hline \end{array}$ 48) $\begin{array}{r} 100 \\ -9 \\ \hline \end{array}$ 49) $\begin{array}{r} 800 \\ -7 \\ \hline \end{array}$
- 50) $\begin{array}{r} 300 \\ -1 \\ \hline \end{array}$ 51) $\begin{array}{r} 815 \\ -457 \\ \hline \end{array}$ 52) $\begin{array}{r} 713 \\ -564 \\ \hline \end{array}$ 53) $\begin{array}{r} 318 \\ -199 \\ \hline \end{array}$ 54) $\begin{array}{r} 7,003 \\ -4,267 \\ \hline \end{array}$ 55) $\begin{array}{r} 9,007 \\ -3,468 \\ \hline \end{array}$ 56) $\begin{array}{r} 4,003 \\ -2,815 \\ \hline \end{array}$
- 57) $\begin{array}{r} 7,000 \\ -2,346 \\ \hline \end{array}$ 58) $\begin{array}{r} 4,000 \\ -2,739 \\ \hline \end{array}$ 59) $\begin{array}{r} 8,000 \\ -5,397 \\ \hline \end{array}$ 60) $\begin{array}{r} 9,000 \\ -2,613 \\ \hline \end{array}$ 61) $\begin{array}{r} 2,000 \\ -1,672 \\ \hline \end{array}$ 62) $\begin{array}{r} 5,000 \\ -382 \\ \hline \end{array}$ 63) $\begin{array}{r} 1,000 \\ -654 \\ \hline \end{array}$
- 64) $\begin{array}{r} 95,083 \\ -64,876 \\ \hline \end{array}$ 65) $\begin{array}{r} 80,000 \\ -35,892 \\ \hline \end{array}$

66) Cross out the wrong numbers in the answers below:

- a. $\begin{array}{r} 634 \\ -98 \\ \hline 546 \end{array}$ b. $\begin{array}{r} 733 \\ -247 \\ \hline 596 \end{array}$ c. $\begin{array}{r} 825 \\ -37 \\ \hline 888 \end{array}$ d. $\begin{array}{r} 616 \\ -457 \\ \hline 169 \end{array}$ e. $\begin{array}{r} 8,579 \\ -5,456 \\ \hline 2,923 \end{array}$ f. $\begin{array}{r} 7,191 \\ -368 \\ \hline 7,823 \end{array}$ g. $\begin{array}{r} 2,957 \\ -973 \\ \hline 2,084 \end{array}$ h. $\begin{array}{r} 4,199 \\ -2,747 \\ \hline 2,452 \end{array}$

67. Copy and subtract:

- a. $700 - 54$ b. $8,000 - 283$ c. $500 - 9$ d. $3,000 - 13$

68. Cross out the wrong numbers in the answers below:

- a. $\begin{array}{r} 920 \\ -646 \\ \hline 284 \end{array}$ b. $\begin{array}{r} 900 \\ -181 \\ \hline 229 \end{array}$ c. $\begin{array}{r} 500 \\ -94 \\ \hline 416 \end{array}$ d. $\begin{array}{r} 5,090 \\ -2,957 \\ \hline 2,143 \end{array}$ e. $\begin{array}{r} 7,000 \\ -4,351 \\ \hline 2,759 \end{array}$
- f. $\begin{array}{r} 2,000 \\ -125 \\ \hline 2,975 \end{array}$ g. $\begin{array}{r} 8,010 \\ -5,929 \\ \hline 3,081 \end{array}$ h. $\begin{array}{r} 9,110 \\ -5,473 \\ \hline 3,647 \end{array}$ i. $\begin{array}{r} 6,000 \\ -4,052 \\ \hline 1,848 \end{array}$ j. $\begin{array}{r} 9,000 \\ -8,727 \\ \hline 1,273 \end{array}$

69. Fill in the puzzle:

A	B		C	D		E	F
G			H			I	
	J	K				L	
M		N	O	P			Q
R	S		T			U	
	V					W	
X			Y	Z		a	b
c			d			e	

ACROSS

- A. $100 - 56$ J. $92 - 17$ X. $126 - 96$
 C. $93 - 48$ L. $98 - 49$ Y. $155 - 76$
 E. 115 N. $6,954 - 5,003$ a. $100 - 84$
 -38 R. $182 - 83$ c. $63 - 19$
 G. 110 T. $96 - 78$ d. 181
 -58 U. $115 - 86$ e. 164
 H. 112 V. $88 - 39$ -87
 -39 W. $42 - 27$

DOWN

- A. $117 - 72$ K. 120 S. $16,001 - 6,597$
 B. $816 - 389$ -69 U. $2,588 - 71$
 C. 100 L. $104 - 63$ X. $42 - 8$
 -53 M. $118 - 59$ Y. 134
 D. $113 - 60$ O. $110 - 19$ -56
 E. $999 - 230$ P. $135 - 77$ Z. 362
 F. $142 - 64$ Q. $110 - 21$ -266
 b. $116 - 49$

ASSIGNMENT 19

Subtract: (Be careful of dollar signs and decimal points.)

- | | | | | |
|--|--|--|--|--|
| 1) $\begin{array}{r} \$2.61 \\ -1.42 \\ \hline \end{array}$ | 2) $\begin{array}{r} \$6.27 \\ -4.35 \\ \hline \end{array}$ | 3) $\begin{array}{r} \$8.12 \\ -2.81 \\ \hline \end{array}$ | 4) $\begin{array}{r} \$3.76 \\ -1.84 \\ \hline \end{array}$ | 5) $\begin{array}{r} \$3.04 \\ -1.18 \\ \hline \end{array}$ |
| 6) $\begin{array}{r} \$1.06 \\ -0.97 \\ \hline \end{array}$ | 7) $\begin{array}{r} \$5.07 \\ -0.19 \\ \hline \end{array}$ | 8) $\begin{array}{r} \$3.07 \\ -2.38 \\ \hline \end{array}$ | 9) $\begin{array}{r} \$1.00 \\ -0.46 \\ \hline \end{array}$ | 10) $\begin{array}{r} \$10.00 \\ -6.59 \\ \hline \end{array}$ |
| 11) $\begin{array}{r} \$9.00 \\ -6.59 \\ \hline \end{array}$ | 12) $\begin{array}{r} \$11.00 \\ -7.63 \\ \hline \end{array}$ | 13) $\begin{array}{r} \$15.00 \\ -9.87 \\ \hline \end{array}$ | 14) $\begin{array}{r} \$3.00 \\ -2.19 \\ \hline \end{array}$ | 15) $\begin{array}{r} \$4.90 \\ -4.00 \\ \hline \end{array}$ |
| 16) $\begin{array}{r} \$20.00 \\ -12.00 \\ \hline \end{array}$ | 17) $\begin{array}{r} \$47.80 \\ -28.67 \\ \hline \end{array}$ | 18) $\begin{array}{r} \$4.26 \\ -2.07 \\ \hline \end{array}$ | 19) $\begin{array}{r} \$8.00 \\ -3.25 \\ \hline \end{array}$ | 20) $\begin{array}{r} \$35.07 \\ -20.27 \\ \hline \end{array}$ |
| 21) $\begin{array}{r} \$40.50 \\ -20.60 \\ \hline \end{array}$ | 22) $\begin{array}{r} \$0.60 \\ -0.25 \\ \hline \end{array}$ | 23) $\begin{array}{r} \$4.05 \\ -0.68 \\ \hline \end{array}$ | 24) $\begin{array}{r} \$5.00 \\ -3.75 \\ \hline \end{array}$ | 25) $\begin{array}{r} \$7.35 \\ -2.78 \\ \hline \end{array}$ |
| 26) $\begin{array}{r} \$6.18 \\ -0.09 \\ \hline \end{array}$ | 27) $\begin{array}{r} \$9.29 \\ -7.65 \\ \hline \end{array}$ | 28) $\begin{array}{r} \$5.45 \\ -2.64 \\ \hline \end{array}$ | 29) $\begin{array}{r} \$7.08 \\ -6.98 \\ \hline \end{array}$ | 30) $\begin{array}{r} \$9.06 \\ -3.08 \\ \hline \end{array}$ |
| 31) $\begin{array}{r} \$8.00 \\ -2.45 \\ \hline \end{array}$ | 32) $\begin{array}{r} \$6.32 \\ -2.76 \\ \hline \end{array}$ | 33) $\begin{array}{r} \$4.91 \\ -1.95 \\ \hline \end{array}$ | 34) $\begin{array}{r} \$76.59 \\ -5.94 \\ \hline \end{array}$ | 35) $\begin{array}{r} \$49.94 \\ -8.76 \\ \hline \end{array}$ |
| 36) $\begin{array}{r} \$95.30 \\ -4.37 \\ \hline \end{array}$ | 37) $\begin{array}{r} \$28.43 \\ -26.39 \\ \hline \end{array}$ | 38) $\begin{array}{r} \$5.05 \\ -2.08 \\ \hline \end{array}$ | 39) $\begin{array}{r} \$6.03 \\ -4.09 \\ \hline \end{array}$ | 40) $\begin{array}{r} \$20.06 \\ -13.07 \\ \hline \end{array}$ |
| 41) $\begin{array}{r} \$2.50 \\ -1.75 \\ \hline \end{array}$ | 42) $\begin{array}{r} \$80.00 \\ -16.50 \\ \hline \end{array}$ | 43) $\begin{array}{r} \$9.03 \\ -3.49 \\ \hline \end{array}$ | 44) $\begin{array}{r} \$862.24 \\ -275.36 \\ \hline \end{array}$ | 45) $\begin{array}{r} \$417.25 \\ -189.56 \\ \hline \end{array}$ |
| 46) $\begin{array}{r} \$862.24 \\ -275.36 \\ \hline \end{array}$ | 47) $\begin{array}{r} \$541.72 \\ -374.25 \\ \hline \end{array}$ | 48) $\begin{array}{r} \$833.10 \\ -276.29 \\ \hline \end{array}$ | 49) $\begin{array}{r} \$973.00 \\ -600.00 \\ \hline \end{array}$ | |
| 50) Copy and subtract: | | | | |
| a. $\$10.00 - \$2.98$ | c. $\$2.00 - \$0.50$ | e. $\$784.95 - \$238.76$ | | |
| b. $\$100.00 - \$10.25$ | d. $\$90.00 - \$68.43$ | f. $\$600.00 - \$437.62$ | | |

ASSIGNMENT 20

- William had 32 Indian arrowheads in his collection. He gave 13 of them to Bob. How many arrowheads did William have left?
- Ted has 50¢. He wants to buy a baseball cap that costs 98¢. How much more money does he need to buy the cap?
- In West High School 321 out of 410 students have library cards. How many do not have library cards?
- Anne saved \$1.98 toward buying an \$18.00 camera. How much more must she save?
- How much is left from Bill's ten dollars after he has spent \$6.98 for a new football?
- The Pacific Coast of the United States is 1,872 miles long. The Gulf Coast is about 2,040 miles long. The Gulf Coast is how much longer than the Pacific Coast?
- The following table gives air and road distances in miles between some of our large cities.

From	To	Air Distance	Road Distance
New Orleans	Chicago	833	998
Los Angeles	Chicago	1745	2219
San Francisco	New York	2571	3062
New York	Chicago	713	831

 - How much shorter is the air distance than the road distance between each pair of cities?
 - Which two cities are the greatest distance apart?
 - Which two cities are the nearest to each other?
- Alice received \$5.00 for her birthday. She spent \$3.75 of it for a sweater. How much did she have left?
- Start with the number 75 and subtract 9's.

75

- Jim and Bill drove to the beach, a distance of 26 miles. They came home a short way and drove only 17 miles. How many fewer miles did they drive coming home?

11. Mr. Wadsworth is 57 years old. Mr. Benny is 39 years old. How much older is Mr. Wadsworth than Mr. Benny?
12. It costs \$4.80 to travel across the Pennsylvania Turnpike but only \$1.95 on the Indiana Toll Road. How much more does it cost on the Pennsylvania Turnpike than on the Indiana Toll Road?
13. Alan saved \$37.50. How much more does he need to buy a bicycle selling for \$53.19?
14. Nancy spent \$4.58 of her \$5.00 for skates. How much did she have left?
15. Joe wants to buy a bicycle light that costs 95¢. He has only 39¢. How much more money will he need?
16. Tom had \$80.00 in his savings account but he drew out \$20.25. How much money does he have left in his account?
17. Before James' father became ill he weighed 204 pounds. He now weighs 188 pounds. How many pounds did he lose?
18. Henry's family took an automobile trip. The speedometer on the car registered 3,602 miles when they started and 9,204 miles when they returned. How many miles did the family drive on the trip?
19. Alaska has an area of 589,400 square miles. Texas has an area of 267,339 square miles. How much larger is Alaska than Texas?
20. Mr. Jones bought a car for \$2,200.00. His old car was worth \$560 as a trade in. How much cash did Mr. Jones have to pay?
21. About 87,000 people are employed in the television industry. In this group there are 9,275 announcers. How many people are employed in television who are not announcers?
22. Mr. Stone can pay \$1,675 toward the purchase of a new home. If the cost of the home is \$9,290, how much must he borrow to complete the purchase?
23. If Mr. Stone buys the new home his payments would be \$59.65 a month. He is now paying \$67.50 rent. How much less than his rent will each payment be?
24. Mr. Stone's take-home-pay is \$325.00 a month. How much will he have left each month after making his monthly payment? (See Problem 23)
25. Make up subtraction problems using one of the following words in each problem:
 - a. taller
 - b. farther
 - c. higher
 - d. left
26. How much change should Mary receive from \$20.00 if her purchase was \$9.89?

27. The heights of some of the tallest buildings in the United States are:

Empire State building	(New York City)	1250 feet
Chrysler building	(New York City)	1046 feet
Waldorf-Astoria hotel	(New York City)	625 feet
Board of Trade building	(Chicago)	605 feet
Prudential Life Insurance building	(Chicago)	601 feet

How much taller is the:

- Empire State building than the Board of Trade building?
- Waldorf-Astoria hotel than the Prudential building?
- Chrysler building than the Prudential building?
- Empire State building than the Prudential building?

28. The final standings in the National League in 1957 are given in the following table:

	<u>Won</u>	<u>Lost</u>
Milwaukee	95	59
St. Louis	87	67
Brooklyn	84	70
Cincinnati	80	74
Philadelphia	77	77
New York	69	85
Pittsburg	62	92
Chicago	62	92

How many more games did:

- Milwaukee win than St. Louis?
- Cincinnati win than Chicago?
- Brooklyn win than Pittsburg?
- Chicago lose than Philadelphia?
- New York lose than St. Louis?

29. The chart below indicates the distance from Chicago to other leading cities and the cost of traveling by bus, train, and air between these cities.

<u>From</u>	<u>To</u>	<u>Miles</u>	<u>Bus</u>	<u>Train Fare</u>	<u>Airplane</u>
Chicago	New York	831	\$23.40	\$39.11	\$52.75
Chicago	Boston	985	\$27.45	\$44.08	\$62.75
Chicago	Los Angeles	2219	\$48.75	\$81.59	\$132.39

How much farther is:

- Chicago from Boston than Chicago from New York?
- Chicago from Los Angeles than Chicago from Boston?

How much cheaper is it to travel by bus than by train from:

- Chicago to New York?
- Chicago to Los Angeles?

How much more expensive is it to travel by airplane than by train from:

- Chicago to Boston?
- Chicago to New York?
- Chicago to Los Angeles?

ASSIGNMENT 21

Paying close attention to signs, do the following problems:

- 1) $\begin{array}{r} 620 \\ +186 \\ \hline \end{array}$
- 2) $\begin{array}{r} 781 \\ -483 \\ \hline \end{array}$
- 3) $\begin{array}{r} 467 \\ +534 \\ \hline \end{array}$
- 4) $\begin{array}{r} 2056 \\ -1877 \\ \hline \end{array}$
- 5) $\begin{array}{r} 1025 \\ +3078 \\ \hline \end{array}$
- 6) $\begin{array}{r} 15,312 \\ -9,423 \\ \hline \end{array}$
- 7) $\begin{array}{r} 3,064 \\ +2,078 \\ \hline \end{array}$
- 8) $\begin{array}{r} 32,100 \\ -7,905 \\ \hline \end{array}$
- 9) $79 + 465 + 87 + 304 + 90$
- 10) $\$10.00 - \$.69$
- 11) $\begin{array}{r} \$1.13 \\ .24 \\ +.32 \\ \hline \end{array}$
- 12) $\begin{array}{r} \$1.62 \\ .73 \\ +2.00 \\ \hline \end{array}$
- 13) $481 + 8 + 217$
- 14) $72 + 303 + 85$
- 15) $\begin{array}{r} 376 \\ 943 \\ 872 \\ +435 \\ \hline \end{array}$
- 16) $\begin{array}{r} 715 \\ -260 \\ \hline \end{array}$
- 17) $\begin{array}{r} 401 \\ -381 \\ \hline \end{array}$
- 18) $\$1.23 + \$5.05 + \$.37$
- 19) Draw a ring around the largest number:
- 20) Draw a ring around the smallest number:
- 987 897 978 798 789 763 673 736 376 367
- 21) $\begin{array}{r} \$65.09 \\ -22.75 \\ \hline \end{array}$
- 22) $\begin{array}{r} 8001 \\ -3878 \\ \hline \end{array}$
- 23) $\begin{array}{r} 7261 \\ -4955 \\ \hline \end{array}$
- 24) $\begin{array}{r} 345 \\ 109 \\ 98 \\ +774 \\ \hline \end{array}$
- 25) $\begin{array}{r} 3476 \\ -998 \\ \hline \end{array}$
- 26) $\begin{array}{r} 7542 \\ -2784 \\ \hline \end{array}$
- 27) $\begin{array}{r} 4360 \\ 7859 \\ 4327 \\ +8438 \\ \hline \end{array}$
- 28) $\begin{array}{r} \$4.75 \\ .98 \\ .36 \\ +2.47 \\ \hline \end{array}$
- 29) $\begin{array}{r} 80063 \\ -54376 \\ \hline \end{array}$
- 30) $\begin{array}{r} \$87.00 \\ -6.43 \\ \hline \end{array}$
- 31) $\begin{array}{r} \$60.03 \\ -39.96 \\ \hline \end{array}$
- 32) $\begin{array}{r} 500 \\ 3433 \\ 86 \\ 2609 \\ +598 \\ \hline \end{array}$
- 33) $\begin{array}{r} 8000 \\ -3020 \\ \hline \end{array}$
- 34) $\begin{array}{r} 50302 \\ -29875 \\ \hline \end{array}$
- 35) $\begin{array}{r} 50,000 \\ -12,492 \\ \hline \end{array}$

In solving these word problems be sure to do the correct operation.

In some problems you have to do both addition and subtraction.

- 36) Sidney deposited these amounts in the bank in the last month: \$4.25, \$3.10, \$1.38, and \$2.67. How much money did he deposit all together?
- 37) Pete spent \$5.75 for shoes and \$1.68 for a shirt. How much did he spend in all? _____ How much more did he spend for the shoes than he spent for the shirt? _____
- 38) David's father bought 100 stamps. He used 19 stamps on one day and 28 stamps on another day. How many stamps were left?
- 39) James bought a tie for \$1.00, a pair of shoes for \$7.50 and a handkerchief for \$.25. How much did he have left from a \$10.00 bill?
- 40) John had \$40.00 in his savings account. He deposited \$15.00 more. How much did he then have in his account?
- 41) Jack had \$75.50 in his savings account. He withdrew \$15.75. How much did he have left in his account?
- 42) The Hughes family spent \$89.00 for rent, \$153.42 for food, \$26.32 for clothing, \$18.92 for utilities, and \$7.23 for recreation during the month of July. If Mr. Hughes take-home-pay is \$375.00, how much did he have left after paying his bills?
- 43) If Mr. Jackson drives to work it takes him 47 minutes. By bus it takes 58 minutes. How much time does he save by driving?
- 44) It is 2,219 miles from Chicago to Los Angeles. The Rogers family drove 460 miles the first day and 475 miles the second day. How many miles were left for the Rogers family on their trip from Chicago to Los Angeles?
- 45) Mrs. Hall has saved 490 soap coupons. The toaster she wants requires 1265 coupons. How many more coupons does she need to get the toaster?
- 46) The Robinson, McCarthy and Decker families decided to put all their gas coupons together to get a backyard grill that all three families could use. The Robinsons had 497 coupons, the Deckers had 491 coupons, and the McCarthys had 238 coupons. To get the grill they need 1543 coupons. How many more would they need?
- 47) John bought a baseball for \$1.95, a glove for \$4.98, and a bat for \$2.75. How much change will he receive from a ten-dollar bill?

ASSIGNMENT 22

1. Find the missing numbers in each of the magic squares below:

A.

2	?	6
9	5	?
4	?	8

B.

4	9	?
3	5	7
?	?	6

C.

?	3	8
?	5	1
2	7	?

2. Make a new magic square from the one given by adding 6 to each number:

4	18	8
14	10	6
12	2	16

3. Fill in the puzzle:

a	b	c			d	e
f				g		
h			i			
		j				
k	l			m	n	
o			p			
q		r				

Across

Down

a) $624 + 538 + 510 + 658$

d) $15 + 8 + 23 + 16 + 29$

f) $3333 - 2444$

g) $123 + 205 + 310 + 79 + 118$

h) $487 - 461$

i) $5830 - 2919$

j) $51 + 46 + 30 + 25 + 32 + 47$

k) $1927 + 1142 + 3725 + 3084$

m) $302 - 257$

o) $72 + 36 + 185 + 327$

p) $900 - 577$

q) $13 + 9 + 7 + 25 + 40$

r) $4013 - 2508$

a) $731 - 449$

b) $900 - 514$

c) $821 - 782$

d) $231 + 85 + 421 + 194$

e) $25 + 12 + 49 + 38 + 14 + 13$

g) $387 + 162 + 216 + 126$

i) $506 - 268$

j) $4007 - 3737$

k) $116 + 341 + 236 + 110 + 166$

l) $1222 - 398$

m) $25 + 81 + 83 + 80 + 78 + 73$

n) $98 + 105 + 97 + 165 + 70$

p) $594 - 559$

UNIT IV

MULTIPLICATION OF WHOLE NUMBERS

A. Meaning of Multiplication

(SUGGESTIONS FOR TEACHING ASSIGNMENT 23)

Multiplication is a short way of adding. To multiply is to put equal groups together. To add is to put equal or unequal groups together. Problems such as the following should be placed on the blackboard.

1. In Room 114 there are 7 seats in the first row, 8 in the second, 9 in the third and 7 in the fourth. How many seats are there in the room? (Addition)
2. In Room 228 there are 5 rows of seats. Each row has 8 seats in it. How many seats are there in the room? (Multiplication)
3. John works after school. On Monday he worked 4 hours, Tuesday, 3 hours; Wednesday, 5 hours; Thursday, 2 hours. How many hours did he work that week? (Addition)
4. Harry worked after school on Monday, Tuesday, Wednesday, and Thursday. He worked 4 hours each day. How many hours did he work that week? (Multiplication)

There are many more examples in the classroom itself such as number of windowpanes, stacking books in piles, etc. From these examples the student learns the relation between multiplication and addition.

Take one of the multiplication problems above and use the problem to show that the same answer is obtained whether you multiply or add.

Example: There are 8 seats in each row and 5 rows in the room.
How many seats are there?

Solution by addition: $8 + 8 + 8 + 8 + 8 = 40$

Solution by multiplication: $8 \times 5 = 40$

It should be obvious to the student that multiplication is the shorter way to do the problem.

Place problems similar to those below on the blackboard and have the students write them as addition problems.

$$\begin{array}{r} 5 \\ \times 4 \\ \hline \end{array} \quad \begin{array}{r} 7 \\ \times 8 \\ \hline \end{array} \quad \begin{array}{r} 6 \\ \times 3 \\ \hline \end{array} \quad \begin{array}{r} 9 \\ \times 2 \\ \hline \end{array}$$

In writing these problems as addition problems they can be written two ways. The first example:

$$\begin{array}{r} 4 \\ 5 \\ 5 \\ 5 \\ + 5 \\ \hline 20 \end{array} \quad \text{or} \quad \begin{array}{r} 4 \\ 4 \\ 4 \\ 4 \\ + 4 \\ \hline 20 \end{array}$$

From these examples the student learns there is no order to multiplication. That is: $4 \times 5 = 5 \times 4$

Reverse the process and have the students write the following addition problems as multiplication problems.

$$\begin{array}{r} 6 \\ 6 \\ 6 \\ + 6 \\ \hline \end{array} \quad \begin{array}{r} 9 \\ 9 \\ 9 \\ + 9 \\ \hline \end{array} \quad \begin{array}{r} 7 \\ 7 \\ 7 \\ 7 \\ + 7 \\ \hline \end{array} \quad \begin{array}{r} 4 \\ 4 \\ 4 \\ 4 \\ + 4 \\ \hline \end{array}$$

B. Basic Multiplication Facts

(SUGGESTIONS FOR TEACHING ASSIGNMENT 24)

As in the previous operations of addition and subtraction there are also certain basic facts in multiplication. We refer to them as the multiplication tables. The multiplication facts should be developed as a system but practiced in random order.

The method of reading and writing the basic facts in multiplication can be of help in learning them. Take the basic facts or table of 5's as an example. Writing them in horizontal form, we have

$$\begin{array}{l} 1 \times 5 = 5 \\ 2 \times 5 = 10 \\ 3 \times 5 = 15 \end{array}$$

The advantage to the horizontal form is that the student should observe that each succeeding fact is obtained by adding 5 to the previous fact. This conveys the idea that multiplication is addition. Written in vertical form the basic facts are:

$$\begin{array}{r} 5 \\ \times 1 \\ \hline 5 \end{array} \quad \begin{array}{r} 5 \\ \times 2 \\ \hline 10 \end{array} \quad \begin{array}{r} 5 \\ \times 3 \\ \hline 15 \end{array}$$

The advantage to this form is that it is the standard form for all multiplication problems. Care should be taken to make sure the basic facts are read correctly. At first they should be read to give meaning.

Examples: $2 \times 5 = 10$ is read "2 fives are 10."
 $3 \times 5 = 15$ is read "3 fives are 15."

As the student becomes proficient with the tables and understands they are short ways of adding, it is correct to say:

2 times 5 equals 10,
 and 3 times 5 equals 15.

When the teacher feels the group knows the multiplication facts, then it is a good idea to make a composite table of these facts. A composite table shows an orderly arrangement of the facts.

	1	2	3	4	5	6	7	8	9
1	1	2	3	4	5	6	7	8	9
2	2	4	6	8	10	12	14	16	18
3	3	6	9	12	15	18	21	24	27
4	4	8	12	16	20	24	28	32	36
5	5	10	15	20	25	30	35	40	45
6	6	12	18	24	30	36	42	48	54
7	7	14	21	28	35	42	49	56	63
8	8	16	24	32	40	48	56	64	72
9	9	18	27	36	45	54	63	72	81

The table can be used to help the student discover:

1. There is no order to multiplication ($2 \times 3 = 3 \times 2$).
2. Each succeeding number in a row increases by the same amount as the number in the left-hand column.
3. Each succeeding number in a column increases by the same amount as the number at the top.

All devices that the teacher has at his or her command should be used to enable students to learn the basic multiplication facts.

C. Multiplying With One-Place Numbers (No Carrying)

(SUGGESTIONS FOR TEACHING ASSIGNMENT 25)

To explain multiplication of tens, hundreds, and thousands by a one-place number go back to the meaning of our number system and the operation of addition.

$$\begin{array}{r}
 \text{Addition} \\
 \text{Example: } 23 = 2 \text{ tens} + 3 \text{ ones} \\
 23 = 2 \text{ tens} + 3 \text{ ones} \\
 + 23 = 2 \text{ tens} + 3 \text{ ones} \\
 \hline
 6 \text{ tens} + 9 \text{ ones} \\
 \text{or } 60 + 9 = 69
 \end{array}$$

$$\begin{array}{r}
 \text{Multiplication} \\
 23 = 2 \text{ tens} + 3 \text{ ones} \\
 \times 3 = \times 3 \quad \times 3 \\
 \hline
 6 \text{ tens} + 9 \text{ ones} \\
 \text{or } 60 + 9 = 69
 \end{array}$$

Again the emphasis is on the meaning of multiplication. This can be expanded to hundreds and thousands.

$$\begin{array}{r}
 343 = 3 \text{ hundreds} + 4 \text{ tens} + 3 \text{ ones} \\
 \times 2 = \times 2 \quad \times 2 \quad \times 2 \\
 \hline
 6 \text{ hundreds} + 8 \text{ tens} + 6 \text{ ones} \\
 \text{or } 600 + 80 + 6 = 686
 \end{array}$$

$$\begin{array}{r}
 2,132 = 2 \text{ thousands} + 1 \text{ hundred} + 3 \text{ tens} + 2 \text{ ones} \\
 \times 3 = \times 3 \quad \times 3 \quad \times 3 \quad \times 3 \\
 \hline
 6 \text{ thousands} + 3 \text{ hundreds} + 9 \text{ tens} + 6 \text{ ones} \\
 \text{or } 6,000 + 300 + 90 + 6 = 6,396
 \end{array}$$

Examples like those above should be explained carefully before showing the short form. In giving examples be careful not to give any problems that involve carrying.

$$\begin{array}{r} 23 \\ \times 3 \\ \hline \end{array} \quad \begin{array}{r} 21 \\ \times 4 \\ \hline \end{array} \quad \begin{array}{r} 73 \\ \times 2 \\ \hline \end{array} \quad \begin{array}{r} 343 \\ \times 2 \\ \hline \end{array} \quad \begin{array}{r} 421 \\ \times 4 \\ \hline \end{array} \quad \begin{array}{r} 613 \\ \times 2 \\ \hline \end{array}$$

D. Zero in Multiplication

(SUGGESTIONS FOR TEACHING ASSIGNMENT 26)

The properties of zero in multiplication are the same as in other operations. The number zero:

1. Indicates nothing or not any,
2. Serves as a place holder.

To illustrate number one above, use examples such as the following:

1. In a baseball game, a team scored 0 runs in the first inning, 0 runs in the second, and 0 runs in the third inning. The total at the end of three innings was zero runs.
($0 + 0 + 0 = 0$, or $3 \times 0 = 0$)
2. If after throwing the horseshoes four times in a game, you have not made a point your score is zero.
($0 + 0 + 0 + 0 = 0$, or $4 \times 0 = 0$)

The most important function of zero in multiplication is that it serves as a place holder. For example:

$$\begin{array}{r} 20 \\ \times 3 \\ \hline \end{array}$$

To explain the meaning of zero in this problem, break the number down into its parts:

$$\begin{array}{r} 20 = 2 \text{ tens} + 0 \text{ ones} \\ \times 3 = \times 3 \quad \quad \times 3 \\ \hline 6 \text{ tens} + 0 \text{ ones} \\ \text{or } 60 \quad \quad + 0 = 60 \end{array}$$

In this case the 0 keeps the 2 in its tens' place.

Write on the blackboard all the zero facts in multiplication and explain in several examples why the answer is zero in each example.

$$\begin{array}{r} 0 \\ 0 \end{array} \quad \begin{array}{r} 0 \\ 1 \end{array} \quad \begin{array}{r} 0 \\ 2 \end{array} \quad \begin{array}{r} 0 \\ 3 \end{array} \quad \begin{array}{r} 0 \\ 4 \end{array} \quad \begin{array}{r} 0 \\ 5 \end{array} \quad \begin{array}{r} 0 \\ 6 \end{array} \quad \begin{array}{r} 0 \\ 7 \end{array} \quad \begin{array}{r} 0 \\ 8 \end{array} \quad \begin{array}{r} 0 \\ 9 \end{array}$$

$$\begin{array}{r} 1 \\ 0 \end{array} \quad \begin{array}{r} 2 \\ 0 \end{array} \quad \begin{array}{r} 3 \\ 0 \end{array} \quad \begin{array}{r} 4 \\ 0 \end{array} \quad \begin{array}{r} 5 \\ 0 \end{array} \quad \begin{array}{r} 6 \\ 0 \end{array} \quad \begin{array}{r} 7 \\ 0 \end{array} \quad \begin{array}{r} 8 \\ 0 \end{array} \quad \begin{array}{r} 9 \\ 0 \end{array}$$

It is true to say that the second row above (zero ones, zero twos, zero threes, etc.,) presents an impossible situation since you never take anything zero times. But in 2- and 3-place multiplication problems you have problems such as the following:

$$\begin{array}{r} 48 \\ \times 30 \\ \hline \end{array} \quad \begin{array}{r} 92 \\ \times 80 \\ \hline \end{array} \quad \begin{array}{r} 237 \\ \times 900 \\ \hline \end{array} \quad \begin{array}{r} 406 \\ \times 802 \\ \hline \end{array}$$

One of the most common mistakes in multiplication is zero times a number equals the number, such as

$$0 \times 5 = 5$$

Before the students do Assignment 26 it would be well to summarize these facts about zero:

1. Zero indicates nothing, or not any.
2. Zero serves as a place holder.
3. Any number times zero is zero.
4. Zero times any number is zero.

E. Multiplication Involving Money

(SUGGESTIONS FOR TEACHING ASSIGNMENT 27)

Many of the practical problems in multiplication involve money.

One of the problems in multiplication involving money is that the unit price is sometimes given with a cent sign and the answer to the problem is more than \$1.00.

Example: $\begin{array}{r} 41\text{¢} \\ \times 4 \\ \hline 164\text{¢} = \$1.64 \end{array}$

Change the 41¢ to \$.41
then $\begin{array}{r} \$.41 \\ \times 4 \\ \hline \$1.64 \end{array}$

or $\begin{array}{r} 41 \\ \times 4 \\ \hline 164 \end{array}$

In problems of this type fewer mistakes are made if the second method is used. Place the amounts below on the blackboard and have the students convert them to the dollar and cents form.

$$\begin{array}{r} 4\text{¢} \\ 3\text{¢} \end{array} \quad \begin{array}{r} 49\text{¢} \\ 63\text{¢} \end{array} \quad \begin{array}{r} 92\text{¢} \\ 58\text{¢} \end{array} \quad \begin{array}{r} 63\text{¢} \\ 17\text{¢} \end{array} \quad \begin{array}{r} 81\text{¢} \\ 74\text{¢} \end{array} \quad \begin{array}{r} 9\text{¢} \\ 7\text{¢} \end{array} \quad \begin{array}{r} 2\text{¢} \\ 1\text{¢} \end{array}$$

In multiplication problems involving money caution students regarding the following points:

1. If the number is in the cent form, change it to dollars and cents form.
2. Place the amount of money on top. (Make it the multiplicand.)
3. Place a dollar sign and decimal point in your answer.

Do the following problems on the blackboard before the students do Assignment 27:

$$\begin{array}{r} \$2.13 \\ \times 3 \\ \hline \end{array}$$

$$\begin{array}{r} \$7.04 \\ \times 2 \\ \hline \end{array}$$

$$\begin{array}{r} \$9.20 \\ \times 4 \\ \hline \end{array}$$

$$\begin{array}{r} 3\text{¢} \\ \times 2 \\ \hline \end{array}$$

$$\begin{array}{r} \text{or } \$.03 \\ \times 2 \\ \hline \end{array}$$

F. Word Problems (No Carrying)

(SUGGESTIONS FOR TEACHING ASSIGNMENT 28)

Since all problems in multiplication are addition problems, word problems involving multiplication are similar to those in addition except that the groups are the same.

You multiply:

1. When there is the same number in each group and you want to find the number in more than one group.
2. When the cost of items are the same and you want to find the cost of more than one of these items.

G. Carrying Tens

(SUGGESTIONS FOR TEACHING ASSIGNMENT 29)

Although well acquainted with the basic concepts and facts in multiplication some students have difficulty with carrying. This may be for one of the following reasons:

1. Inability to retain the carried number
2. Inability to do multiplication and addition

Before starting the explanation for carrying in multiplication, problems such as the following will assist in avoiding the two mistakes mentioned above.

$$3 \times 6 + 2$$

$$9 \times 2 + 1$$

$$3 \times 7 + 2$$

$$2 \times 4 + 1$$

$$6 \times 4 + 2$$

$$6 \times 2 + 2$$

$$5 \times 2 + 3$$

$$2 \times 8 + 1$$

$$2 \times 9 + 1$$

The problems above should be done orally in class. Speed is not as important as accuracy and rhythm.

To explain the process of carrying, go back to the definition of multiplication. Use the following example:

Addition

23

23

23

23

92

Adding the units you obtain 12. You write down the 2 (because it represents 2 ones) and you carry the 1 (because it represents 1 ten) to the next column (the tens column).

Multiplication

23

$$\begin{array}{r} \times 4 \\ 92 \end{array}$$

Multiplying 4 x 3 ones you obtain 12 ones. 12 ones equals 1 ten plus 2 ones. You write down the 2 (because it represents 2 ones) in the ones column and you carry the 1 (because it represents 1 ten) to the next column (the tens' column). Multiplying 4 x 2 tens gives 8 tens plus the 1 ten carried makes 9 tens. The 9 is written in the tens column.

Examples such as this give meaning to multiplication. It would be well to do several more examples of the same type.

$$\begin{array}{r} 1 \\ 52 \\ \times 7 \\ \hline 364 \end{array}$$

$$\begin{array}{r} 7 \\ 49 \\ \times 8 \\ \hline 392 \end{array}$$

$$\begin{array}{r} 4 \\ 87 \\ \times 6 \\ \hline 522 \end{array}$$

$$\begin{array}{r} 1 \\ 212 \\ \times 7 \\ \hline 1484 \end{array}$$

$$\begin{array}{r} 2 \\ 307 \\ \times 3 \\ \hline 921 \end{array}$$

Allow students to write the carried number if it assists in obtaining the correct answers.

ASSIGNMENT 23

Read each problem carefully and decide whether to add or multiply.
Do not work the problems.

1. Mary bought 4 packages of cupcakes. There were 3 cupcakes in each package. How many cupcakes did she buy?
2. John bought 6 apples that cost 9¢ each. How much did he pay for the apples?
3. On the first day of a trip Mr. Bishop drove 478 miles; the second day he drove 523 miles. How many miles did he drive in all?
4. Jack sold 48 papers the first week in January and 39 the second week. How many papers did he sell?
5. Bob sold 63 papers each week for 5 weeks. How many papers did he sell altogether?
6. Two boys shot 3 arrows each at a target. That was how many arrows in all?
7. To collect and deliver mail in Chicago, a helicopter makes a round trip of 108 miles three times daily. How many miles does it travel in a day?
8. Write each of the following as either addition or multiplication.

a. $4 + 3 + 5 + 9$	d. $11 + 11 + 11 + 11$
b. $6 + 6 + 6 + 2$	e. $10 + 9 + 9 + 9 + 9$
c. $9 + 9 + 9 + 9 + 9$	f. $14 + 14 + 14 + 14 + 14$
9. Next to each group of x's write them as addition and as multiplication problems. Example a has been done for you.

a. $\begin{array}{r} \text{xx} \quad 2 \\ \text{xx} \quad 2 \\ \hline \text{xx} + 2 \end{array}$	b. $\begin{array}{r} \text{xxx} \\ 2 \times 3 \text{ xxx} \end{array}$	c. $\begin{array}{r} \text{xxxx} \\ \text{xxxx} \\ \text{xxxx} \end{array}$	d. $\begin{array}{r} \text{xx} \\ \text{xx} \\ \text{xx} \\ \text{xx} \end{array}$
---	---	--	---
10. Write each problem below as an addition problem.

a. 9×6	c. 7×6	e. 19×8
b. 8×5	d. 4×11	f. 24×13
11. Write each problem below as a multiplication problem.

$\begin{array}{r} 9 \\ 9 \\ 9 \\ \hline +9 \end{array}$	$\begin{array}{r} 7 \\ 7 \\ \hline +7 \end{array}$	$\begin{array}{r} 6 \\ 6 \\ 6 \\ 6 \\ \hline +6 \end{array}$	$\begin{array}{r} 11 \\ 11 \\ 11 \\ 11 \\ \hline +11 \end{array}$	$\begin{array}{r} 18 \\ 18 \\ 18 \\ 18 \\ 18 \\ \hline +18 \end{array}$
---	--	--	---	---

ASSIGNMENT 24

1. Fill in the table below by multiplying the number at the left by the number at the top. Several of the problems have been done for you.

	1	2	3	4	5	6	7	8	9
1				4					
2						12			
3									
4					20				
5									
6							42		
7									
8		16							
9									

2. Using the chart from Problem 1

- How many 12's did you write in the chart? _____
- How many 24's did you write in the chart? _____
- How many 6's did you write in the chart? _____
- How many 56's did you write in the chart? _____

3. Fill in the table by multiplying the number at the left by the number at the top.

	4	1	9	7	6	3	8	2	5
8	32								
3				18					
1									
5			45						
9									
2									
4					12				
7									
6									

4. Fill in the numbers in the puzzle.

a	b		c
d			
		e	f
g		h	
i			

Across

- $5 \times 6 + 3$
- $2 \times 3 + 2$
- $9 \times 8 + 6$
- $6 \times 9 + 3$
- $3 \times 2 + 1$
- $4 \times 7 + 7$
- $3 \times 4 + 3$

Down

- $8 \times 4 + 5$
- $6 \times 6 + 2$
- $7 \times 7 + 4$
- $8 \times 9 + 3$
- $8 \times 8 + 7$

ASSIGNMENT 25

Multiply:

$$\begin{array}{r} 1) \ 41 \\ \underline{2} \end{array}$$

$$\begin{array}{r} 2) \ 32 \\ \underline{3} \end{array}$$

$$\begin{array}{r} 3) \ 11 \\ \underline{7} \end{array}$$

$$\begin{array}{r} 4) \ 12 \\ \underline{4} \end{array}$$

$$\begin{array}{r} 5) \ 14 \\ \underline{2} \end{array}$$

$$\begin{array}{r} 6) \ 11 \\ \underline{6} \end{array}$$

$$\begin{array}{r} 7) \ 21 \\ \underline{3} \end{array}$$

$$\begin{array}{r} 8) \ 32 \\ \underline{4} \end{array}$$

$$\begin{array}{r} 9) \ 12 \\ \underline{3} \end{array}$$

$$\begin{array}{r} 10) \ 42 \\ \underline{4} \end{array}$$

$$\begin{array}{r} 11) \ 31 \\ \underline{9} \end{array}$$

$$\begin{array}{r} 12) \ 61 \\ \underline{4} \end{array}$$

$$\begin{array}{r} 13) \ 93 \\ \underline{2} \end{array}$$

$$\begin{array}{r} 14) \ 21 \\ \underline{9} \end{array}$$

$$\begin{array}{r} 15) \ 62 \\ \underline{4} \end{array}$$

$$\begin{array}{r} 16) \ 93 \\ \underline{3} \end{array}$$

$$\begin{array}{r} 17) \ 83 \\ \underline{3} \end{array}$$

$$\begin{array}{r} 18) \ 74 \\ \underline{2} \end{array}$$

$$\begin{array}{r} 19) \ 21 \\ \underline{7} \end{array}$$

$$\begin{array}{r} 20) \ 53 \\ \underline{3} \end{array}$$

$$\begin{array}{r} 21) \ 72 \\ \underline{4} \end{array}$$

$$\begin{array}{r} 22) \ 83 \\ \underline{2} \end{array}$$

$$\begin{array}{r} 23) \ 314 \\ \underline{2} \end{array}$$

$$\begin{array}{r} 24) \ 223 \\ \underline{3} \end{array}$$

$$\begin{array}{r} 25) \ 711 \\ \underline{6} \end{array}$$

$$\begin{array}{r} 26) \ 233 \\ \underline{3} \end{array}$$

$$\begin{array}{r} 27) \ 922 \\ \underline{4} \end{array}$$

$$\begin{array}{r} 28) \ 412 \\ \underline{3} \end{array}$$

$$\begin{array}{r} 29) \ 2,341 \\ \underline{2} \end{array}$$

$$\begin{array}{r} 30) \ 3,223 \\ \underline{3} \end{array}$$

$$\begin{array}{r} 31) \ 7,124 \\ \underline{2} \end{array}$$

$$\begin{array}{r} 32) \ 8,111 \\ \underline{9} \end{array}$$

$$\begin{array}{r} 33) \ 7,122 \\ \underline{4} \end{array}$$

$$\begin{array}{r} 34) \ 4,323 \\ \underline{3} \end{array}$$

$$\begin{array}{r} 35) \ 5,122 \\ \underline{2} \end{array}$$

$$\begin{array}{r} 36) \ 23,312 \\ \underline{3} \end{array}$$

$$\begin{array}{r} 37) \ 42,211 \\ \underline{4} \end{array}$$

$$\begin{array}{r} 38) \ 33,421 \\ \underline{2} \end{array}$$

$$\begin{array}{r} 39) \ 21,212 \\ \underline{3} \end{array}$$

$$\begin{array}{r} 40) \ 42,112 \\ \underline{4} \end{array}$$

ASSIGNMENT 26

Write each problem as a multiplication problem and multiply:

$$1) \ 0 + 0 + 0$$

$$3) \ 0 + 0 + 0 + 0 + 0 + 0 + 0$$

$$2) \ 0 + 0 + 0 + 0 + 0$$

$$4) \ 0 + 0$$

ASSIGNMENT 26 (Cont.)

Write each problem as an addition problem and add:

5) 3×0

6) 7×0

7) 5×0

8) Fill in the blank spaces:

a. zero times any number is _____.

b. Any number times zero is _____.

Multiply:

9) $\begin{array}{r} 0 \\ 7 \end{array}$

10) $\begin{array}{r} 0 \\ 3 \end{array}$

11) $\begin{array}{r} 9 \\ 0 \end{array}$

12) $\begin{array}{r} 5 \\ 0 \end{array}$

13) $\begin{array}{r} 2 \\ 0 \end{array}$

14) $\begin{array}{r} 30 \\ 3 \end{array}$

15) $\begin{array}{r} 10 \\ 9 \end{array}$

16) $\begin{array}{r} 20 \\ 6 \end{array}$

17) $\begin{array}{r} 90 \\ 4 \end{array}$

18) $\begin{array}{r} 40 \\ 8 \end{array}$

19) $\begin{array}{r} 70 \\ 7 \end{array}$

20) $\begin{array}{r} 30 \\ 6 \end{array}$

21) $\begin{array}{r} 504 \\ 2 \end{array}$

22) $\begin{array}{r} 301 \\ 7 \end{array}$

23) $\begin{array}{r} 903 \\ 3 \end{array}$

24) $\begin{array}{r} 701 \\ 9 \end{array}$

25) $\begin{array}{r} 802 \\ 4 \end{array}$

26) $\begin{array}{r} 310 \\ 3 \end{array}$

27) $\begin{array}{r} 920 \\ 4 \end{array}$

28) $\begin{array}{r} 630 \\ 2 \end{array}$

29) $\begin{array}{r} 810 \\ 9 \end{array}$

30) $\begin{array}{r} 740 \\ 2 \end{array}$

31) $\begin{array}{r} 400 \\ 9 \end{array}$

32) $\begin{array}{r} 600 \\ 8 \end{array}$

33) $\begin{array}{r} 200 \\ 3 \end{array}$

34) $\begin{array}{r} 900 \\ 6 \end{array}$

35) $\begin{array}{r} 300 \\ 7 \end{array}$

36) $\begin{array}{r} 100 \\ 5 \end{array}$

37) The chart below is a box score from a basketball game:

Player	Baskets	Free Throws	Total Points
Harry	3	1	7
Jim	5	2	
George	2	5	
Charlie	0	3	
Michael	2	0	
Kevin	0	0	

Each basket counts 2 points and each free throw 1 point. To find the total points for each player you multiply the number of baskets by 2 and add the number of free throws. Example:

Harry 3 baskets $\times 2 = 6$ $6 + 1$ (free throw) = 7 total points

- Find the total points for each player in the chart.
- Who scored the most points?
- Who scored the least number of points?
- Kevin made 0 baskets and 0 free throws. Did he participate in the game?

ASSIGNMENT 27

Change each of the following amounts of money to the dollars and cents form. Problem 1 has been done for you.

- | | | |
|----------------|----------|----------|
| 1) 19¢ = \$.19 | 4) 3¢ = | 7) 99¢ = |
| 2) 12¢ = | 5) 9¢ = | 8) 58¢ = |
| 3) 46¢ = | 6) 91¢ = | 9) 7¢ = |

Select the larger amount in each of the following:

- 10) Four dimes or two quarters
- 11) Seven nickels or three dimes
- 12) Three quarters or six dimes and four nickels

Multiply:

- | | | | | |
|---|---|---|---|---|
| 13) $\begin{array}{r} 11¢ \\ \times 5 \\ \hline \end{array}$ | 14) $\begin{array}{r} 32¢ \\ \times 3 \\ \hline \end{array}$ | 15) $\begin{array}{r} 22¢ \\ \times 4 \\ \hline \end{array}$ | 16) $\begin{array}{r} 12¢ \\ \times 2 \\ \hline \end{array}$ | 17) $\begin{array}{r} 82¢ \\ \times 3 \\ \hline \end{array}$ |
| 18) $\begin{array}{r} 94¢ \\ \times 2 \\ \hline \end{array}$ | 19) $\begin{array}{r} 73¢ \\ \times 3 \\ \hline \end{array}$ | 20) $\begin{array}{r} 91¢ \\ \times 4 \\ \hline \end{array}$ | 21) $\begin{array}{r} 12¢ \\ \times 4 \\ \hline \end{array}$ | 22) $\begin{array}{r} 11¢ \\ \times 9 \\ \hline \end{array}$ |
| 23) $\begin{array}{r} 70¢ \\ \times 2 \\ \hline \end{array}$ | 24) $\begin{array}{r} 20¢ \\ \times 9 \\ \hline \end{array}$ | 25) $\begin{array}{r} 90¢ \\ \times 8 \\ \hline \end{array}$ | 26) $\begin{array}{r} 40¢ \\ \times 6 \\ \hline \end{array}$ | 27) $\begin{array}{r} \$5.13 \\ \times 3 \\ \hline \end{array}$ |
| 28) $\begin{array}{r} \$6.12 \\ \times 4 \\ \hline \end{array}$ | 29) $\begin{array}{r} \$7.23 \\ \times 3 \\ \hline \end{array}$ | 30) $\begin{array}{r} \$12.24 \\ \times 2 \\ \hline \end{array}$ | 31) $\begin{array}{r} \$3.02 \\ \times 4 \\ \hline \end{array}$ | 32) $\begin{array}{r} \$4.02 \\ \times 3 \\ \hline \end{array}$ |
| 33) $\begin{array}{r} \$6.10 \\ \times 6 \\ \hline \end{array}$ | 34) $\begin{array}{r} \$9.20 \\ \times 4 \\ \hline \end{array}$ | 35) $\begin{array}{r} \$13.30 \\ \times 3 \\ \hline \end{array}$ | 36) $\begin{array}{r} \$9.06 \\ \times 1 \\ \hline \end{array}$ | 37) $\begin{array}{r} \$24.30 \\ \times 2 \\ \hline \end{array}$ |
| 38) $\begin{array}{r} \$221.12 \\ \times 4 \\ \hline \end{array}$ | 39) $\begin{array}{r} \$412.33 \\ \times 3 \\ \hline \end{array}$ | 40) $\begin{array}{r} \$611.13 \\ \times 3 \\ \hline \end{array}$ | 41) $\begin{array}{r} \$712.43 \\ \times 2 \\ \hline \end{array}$ | 42) $\begin{array}{r} \$3,321.13 \\ \times 3 \\ \hline \end{array}$ |
| 43) $\begin{array}{r} \$20.23 \\ \times 3 \\ \hline \end{array}$ | 44) $\begin{array}{r} \$40.02 \\ \times 4 \\ \hline \end{array}$ | 45) $\begin{array}{r} \$400.12 \\ \times 2 \\ \hline \end{array}$ | 46) $\begin{array}{r} \$2,100.02 \\ \times 4 \\ \hline \end{array}$ | |

Copy and multiply:

- | | | | |
|------------------------|-------------------------|-------------------------|-------------------------|
| 47) $5 \times \$10.01$ | 48) $7 \times \$210.01$ | 49) $\$234.23 \times 2$ | 50) $\$112.12 \times 4$ |
|------------------------|-------------------------|-------------------------|-------------------------|

ASSIGNMENT 28

1. Judy Russel is 12 years old. Her father is four times as old. How old is her father?
2. The Decker's family car travels 211 miles on a tankful of gasoline. On a trip they used 6 tankfuls of gasoline. How long was the trip?

3. A speed boat takes passengers on short trips around the lake. The boat can carry 21 passengers. How many passengers can be carried on 9 trips?
4. In most large cities there are sight-seeing buses to take visitors to see the sights of the city. The bus carries 33 passengers. How many passengers can be carried on 3 trips?
5. A block is 300 feet long. How many feet are there in 4 blocks?
6. There are 7 members in the Dodge family. When Mrs. Dodge sets the table she places a knife, fork, and spoon at each plate. How many pieces of silver does she use?
7. A car carrier hauled 4 cars from Detroit to Chicago. Each car weighed 3,122 pounds. How much did all 4 cars weigh?
8. Mr. French bought 4 new tires for his car. Each tire cost \$20.20. How much did all 4 tires cost?
9. If each of 9 passengers on a plane are allowed 40 pounds of baggage, how much can be carried for all of the passengers?
10. A car travels 11 miles on a gallon of gas. How many miles can it travel on 8 gallons of gas?

ASSIGNMENT 29

Multiply:

$$\begin{array}{r} 1) \quad 16 \\ \underline{2} \end{array} \quad \begin{array}{r} 2) \quad 13 \\ \underline{5} \end{array} \quad \begin{array}{r} 3) \quad 24 \\ \underline{7} \end{array} \quad \begin{array}{r} 4) \quad 17 \\ \underline{4} \end{array} \quad \begin{array}{r} 5) \quad \$1.19 \\ \underline{2} \end{array}$$

$$\begin{array}{r} 6) \quad \$3.35 \\ \underline{6} \end{array} \quad \begin{array}{r} 7) \quad \$8.89 \\ \underline{5} \end{array} \quad \begin{array}{r} 8) \quad 164 \\ \underline{3} \end{array} \quad \begin{array}{r} 9) \quad 464 \\ \underline{2} \end{array} \quad \begin{array}{r} 10) \quad 24 \\ \underline{8} \end{array}$$

$$\begin{array}{r} 11) \quad 49 \\ \underline{7} \end{array} \quad \begin{array}{r} 12) \quad \$5.53 \\ \underline{6} \end{array} \quad \begin{array}{r} 13) \quad 96 \\ \underline{8} \end{array} \quad \begin{array}{r} 14) \quad 38 \\ \underline{5} \end{array} \quad \begin{array}{r} 15) \quad \$4.44 \\ \underline{6} \end{array}$$

$$\begin{array}{r} 16) \quad \$2.27 \\ \underline{7} \end{array} \quad \begin{array}{r} 17) \quad 79 \\ \underline{8} \end{array} \quad \begin{array}{r} 18) \quad 68 \\ \underline{7} \end{array} \quad \begin{array}{r} 19) \quad 54 \\ \underline{6} \end{array} \quad \begin{array}{r} 20) \quad 96 \\ \underline{9} \end{array}$$

$$\begin{array}{r} 21) \quad \$2.28 \\ \underline{7} \end{array} \quad \begin{array}{r} 22) \quad \$3.37 \\ \underline{8} \end{array} \quad \begin{array}{r} 23) \quad 114 \\ \underline{7} \end{array} \quad \begin{array}{r} 24) \quad 116 \\ \underline{4} \end{array} \quad \begin{array}{r} 25) \quad 139 \\ \underline{2} \end{array}$$

$$\begin{array}{r} 26) \quad \$2.25 \\ \underline{3} \end{array} \quad \begin{array}{r} 27) \quad \$5.18 \\ \underline{3} \end{array} \quad \begin{array}{r} 28) \quad \$2.27 \\ \underline{3} \end{array} \quad \begin{array}{r} 29) \quad \$1.02 \\ \underline{9} \end{array} \quad \begin{array}{r} 30) \quad 206 \\ \underline{4} \end{array}$$

$$\begin{array}{r} 31) \quad 407 \\ \underline{3} \end{array} \quad \begin{array}{r} 32) \quad 908 \\ \underline{2} \end{array} \quad \begin{array}{r} 33) \quad 706 \\ \underline{7} \end{array} \quad \begin{array}{r} 34) \quad 209 \\ \underline{7} \end{array} \quad \begin{array}{r} 35) \quad 909 \\ \underline{6} \end{array}$$

$$\begin{array}{r} 36) \quad 807 \\ \underline{7} \end{array} \quad \begin{array}{r} 37) \quad 204 \\ \underline{9} \end{array} \quad \begin{array}{r} 38) \quad 305 \\ \underline{8} \end{array} \quad \begin{array}{r} 39) \quad 704 \\ \underline{6} \end{array} \quad \begin{array}{r} 40) \quad 308 \\ \underline{5} \end{array}$$

H. Carrying Hundreds and Thousands

(SUGGESTIONS FOR TEACHING ASSIGNMENT 30)

Once the process of carrying has been explained carefully it is not difficult to extend it to cover carrying to the hundreds' and thousands' place. Use examples such as the following:

Addition

$$\begin{array}{r} / \\ 243 \\ 243 \\ \underline{243} \\ 729 \end{array}$$

Explanation:

Adding the tens' column we obtain 12 tens. 12 tens = 1 hundred + 2 tens. We carry the 1 hundred to the next column (the hundreds' column). Adding the hundreds we get 6 and the 1 carried makes 7.

Multiplication

$$\begin{array}{r} / \\ 243 \\ \times 3 \\ \hline 729 \end{array}$$

When we multiply 3 times 4 tens we obtain 12 tens or 1 hundred + 2 tens. We write down the 2 (because it represents tens) and carry the 1 to the hundreds' column (because it stands for 1 hundred). 3 times 2 hundreds is 6 hundreds plus the 1 hundred carried makes 7 hundreds.

Extending carrying to the thousands' place:

$$\begin{array}{r} / \\ 3,412 \\ \times 4 \\ \hline 13,648 \end{array}$$

Multiplying 4 x 4 hundreds we obtain 16 hundreds. 16 hundreds = 1 thousand + 6 hundreds. We write the 6 in the hundreds' column and carry the 1 thousand to the next column (the thousands place). 4 times 3 thousand is 12 thousand plus the 1 thousand carried makes 13 thousand.

Several more examples similar to the following should be worked at the blackboard before students start Assignment 30.

$$\begin{array}{r} 2 \\ 472 \\ \times 4 \\ \hline 1,888 \end{array}$$

$$\begin{array}{r} 3 \\ 2,511 \\ \times 7 \\ \hline 17,577 \end{array}$$

$$\begin{array}{r} 11 \\ 423 \\ \times 6 \\ \hline 2,538 \end{array}$$

$$\begin{array}{r} 524 \\ 5725 \\ \times 8 \\ \hline 45,800 \end{array}$$

I. Multiplication by Ten and Multiples of Ten

(SUGGESTIONS FOR TEACHING ASSIGNMENT 31)

In order for students to understand the process of multiplying by a two-place number careful explanation is necessary.

Explain each of the following steps carefully:

1. Multiplying by 10 is the same as multiplying by 1 and adding a zero.

Go over the following problems on the blackboard with the students:

$$\begin{array}{r} 10 \\ \times 4 \\ \hline \end{array}$$

$$\begin{array}{r} 10 \\ \times 5 \\ \hline \end{array}$$

$$\begin{array}{r} 10 \\ \times 9 \\ \hline \end{array}$$

$$\begin{array}{r} 10 \\ \times 2 \\ \hline \end{array}$$

$$\begin{array}{r} 10 \\ \times 6 \\ \hline \end{array}$$

Turning each of the problems around we obtain:

$$\begin{array}{r} 4 \\ \times 10 \\ \hline \end{array}$$

$$\begin{array}{r} 5 \\ \times 10 \\ \hline \end{array}$$

$$\begin{array}{r} 9 \\ \times 10 \\ \hline \end{array}$$

$$\begin{array}{r} 2 \\ \times 10 \\ \hline \end{array}$$

$$\begin{array}{r} 6 \\ \times 10 \\ \hline \end{array}$$

Another way to say it is: To multiply a whole number by 10, place a zero after the number.

Place the following examples on the blackboard and go over them orally with the pupils.

10×4

10×24

10×43

10×12

10×8

10×13

10×32

10×76

10×7

10×98

10×63

10×67

2. Multiplying by more than 1 ten

Multiplying a one-place number by more than one ten is just one step more difficult than multiplying by ten.

To multiply 40×2 we break the 40 into tens:

40×2 is the same as 4 tens $\times 2 = 8$ tens or 80

Use other examples:

30×3 is the same as 3 tens $\times 3 = 9$ tens or 90

70×2 is the same as 7 tens $\times 2 = 14$ tens or 140

20×6 is the same as 2 tens $\times 6 = 12$ tens or 120

Place the following problems on the blackboard and do orally with the students.

60×2 is the same as 6 tens $\times 2 = 12$ tens or 120

40×5 is the same as 4 tens $\times 5 = 20$ tens or 200

50×3 is the same as 5 tens $\times 3 = 15$ tens or 150

Take each of these examples and write them in vertical form.

$$\begin{array}{r} 2 \\ \times 60 \\ \hline \end{array}$$

$$\begin{array}{r} 5 \\ \times 40 \\ \hline \end{array}$$

$$\begin{array}{r} 3 \\ \times 50 \\ \hline \end{array}$$

Extend this row to include 2-place numbers in the multiplicand.

$10 \times 13 = 1 \text{ ten} \times 13 = 13 \text{ tens or } 130$

$$\begin{array}{r} 13 \\ \times 10 \\ \hline 130 \end{array}$$

$10 \times 26 = 1 \text{ ten} \times 26 = 26 \text{ tens or } 260$

$$\begin{array}{r} 26 \\ \times 10 \\ \hline 260 \end{array}$$

$10 \times 38 = 1 \text{ ten} \times 38 = 38 \text{ tens or } 380$

$$\begin{array}{r} 38 \\ \times 10 \\ \hline 380 \end{array}$$

$10 \times 53 = 1 \text{ ten} \times 53 = 53 \text{ tens or } 530$

$$\begin{array}{r} 53 \\ \times 10 \\ \hline 530 \end{array}$$

Before the students do Assignment 31 enough examples should be done so that the students understand multiplying by ten and multiples of ten.

J. Multiplying by Two-Place Numbers

(SUGGESTIONS FOR TEACHING ASSIGNMENT 32)

The explanation in Part I and the problems in Assignment 31 lead directly to the problem of multiplying by two-place numbers. Take

one of the previous examples:

30×4 is the same as 3 tens $\times 4 = 12$ tens or 120.

Written in vertical form:

$$\begin{array}{r} 30 \\ \times 4 \\ \hline 120 \end{array}$$

When we multiply by one number such as:

$$\begin{array}{r} 23 \\ \times 2 \\ \hline 46 \end{array} \quad 23 \times 2 \text{ ones} = 46 \text{ ones or 4 tens plus 6 ones}$$

In the same way:

$$\begin{array}{r} 14 \\ \times 20 \\ \hline 280 \end{array} \quad 14 \times 20 \text{ is the same as } 14 \times 2 \text{ tens} = 28 \text{ tens or 280.}$$

The zero in the answer holds the ones' place because the answer does not have any ones in it. The answer is 28 tens or 280 which is 2 hundreds and 8 tens.

Therefore the 2 goes in the hundreds' column and the 8 in the tens' column.

You multiply by tens just as you multiply by ones. You write 0 in ones' place in the answer to show the answer means tens. In doing the examples below at the blackboard with the pupils go over the step very carefully of writing the zero in the ones' place because there are no ones in the answer.

$$\begin{array}{r} 13 \\ \times 20 \\ \hline \end{array} \quad \begin{array}{r} 37 \\ \times 40 \\ \hline \end{array} \quad \begin{array}{r} 92 \\ \times 50 \\ \hline \end{array} \quad \begin{array}{r} 81 \\ \times 60 \\ \hline \end{array} \quad \begin{array}{r} 74 \\ \times 30 \\ \hline \end{array} \quad \begin{array}{r} 65 \\ \times 70 \\ \hline \end{array}$$

From the previous examples and a knowledge of the number system we can multiply by a two-place number.

32
x 23

Do the multiplication in steps.

Break the 23 into 2 tens and 3 ones.

Multiply the 32 by 3 ones.

Then multiply the 32 by 2 tens.

Add the products together.

Multiply by ones

$$\begin{array}{r} 32 \\ \times 3 \text{ ones} \\ \hline 96 \text{ ones} = 96 \end{array}$$

Multiply by tens

$$\begin{array}{r} 32 \\ \times 2 \text{ tens} \\ \hline 64 \text{ tens} = 640 \end{array}$$

Add the products

$$\begin{array}{r} 96 \\ 640 \\ \hline 736 \end{array}$$

Work several more examples in the same way.

$$\begin{array}{r} 43 \\ \times 12 \\ \hline \end{array} \quad \begin{array}{r} 23 \\ \times 33 \\ \hline \end{array}$$

The process can be put into one form as follows:

	Multiplying by ones	Multiplying by tens	Adding the products
32	32	32	
x 23	x 3	x 20	
96	96	640	96
640			640
736			736

Using this method and form, multiplication by two-place numbers has meaning. Without an adequate explanation it is a matter of rote memorization as to where to place the numbers. The zero in the second partial product (640) should be retained until all the students understand that there are no ones in that particular multiplication and the zero serves as a place holder to keep the 64 in its place. Work the following examples in the same way.

$$\begin{array}{r} 12 \\ \times 23 \\ \hline \end{array}$$

$$\begin{array}{r} 41 \\ \times 32 \\ \hline \end{array}$$

$$\begin{array}{r} 82 \\ \times 41 \\ \hline \end{array}$$

$$\begin{array}{r} 43 \\ \times 25 \\ \hline \end{array}$$

When the students should be allowed to leave the zero out of the second partial product should be decided by the teacher.

ASSIGNMENT 30

Multiply:

- | | | | | |
|---|---|---|---|---|
| 1) $\begin{array}{r} 574 \\ \times 6 \\ \hline \end{array}$ | 2) $\begin{array}{r} 452 \\ \times 7 \\ \hline \end{array}$ | 3) $\begin{array}{r} 576 \\ \times 8 \\ \hline \end{array}$ | 4) $\begin{array}{r} 478 \\ \times 6 \\ \hline \end{array}$ | 5) $\begin{array}{r} 986 \\ \times 4 \\ \hline \end{array}$ |
| 6) $\begin{array}{r} 358 \\ \times 9 \\ \hline \end{array}$ | 7) $\begin{array}{r} 769 \\ \times 5 \\ \hline \end{array}$ | 8) $\begin{array}{r} 983 \\ \times 8 \\ \hline \end{array}$ | 9) $\begin{array}{r} \$637 \\ \times 4 \\ \hline \end{array}$ | 10) $\begin{array}{r} \$426 \\ \times 9 \\ \hline \end{array}$ |
| 11) $\begin{array}{r} 368 \\ \times 5 \\ \hline \end{array}$ | 12) $\begin{array}{r} \$2.67 \\ \times 3 \\ \hline \end{array}$ | 13) $\begin{array}{r} \$9.62 \\ \times 8 \\ \hline \end{array}$ | 14) $\begin{array}{r} \$7.13 \\ \times 7 \\ \hline \end{array}$ | 15) $\begin{array}{r} 3,516 \\ \times 4 \\ \hline \end{array}$ |
| 16) $\begin{array}{r} 7,842 \\ \times 5 \\ \hline \end{array}$ | 17) $\begin{array}{r} 8,123 \\ \times 9 \\ \hline \end{array}$ | 18) $\begin{array}{r} 2,563 \\ \times 4 \\ \hline \end{array}$ | 19) $\begin{array}{r} 5,655 \\ \times 8 \\ \hline \end{array}$ | 20) $\begin{array}{r} 6,982 \\ \times 3 \\ \hline \end{array}$ |
| 21) $\begin{array}{r} 3,112 \\ \times 4 \\ \hline \end{array}$ | 22) $\begin{array}{r} \$23.46 \\ \times 3 \\ \hline \end{array}$ | 23) $\begin{array}{r} \$45.83 \\ \times 6 \\ \hline \end{array}$ | 24) $\begin{array}{r} \$67.59 \\ \times 8 \\ \hline \end{array}$ | 25) $\begin{array}{r} 208 \\ \times 9 \\ \hline \end{array}$ |
| 26) $\begin{array}{r} 709 \\ \times 7 \\ \hline \end{array}$ | 27) $\begin{array}{r} 3075 \\ \times 4 \\ \hline \end{array}$ | 28) $\begin{array}{r} 5099 \\ \times 6 \\ \hline \end{array}$ | 29) $\begin{array}{r} \$30.08 \\ \times 7 \\ \hline \end{array}$ | 30) $\begin{array}{r} \$50.61 \\ \times 6 \\ \hline \end{array}$ |
| 31) $\begin{array}{r} \$267.27 \\ \times 4 \\ \hline \end{array}$ | 32) $\begin{array}{r} \$543.19 \\ \times 7 \\ \hline \end{array}$ | 33) $\begin{array}{r} \$803.65 \\ \times 8 \\ \hline \end{array}$ | 34) $\begin{array}{r} \$900.89 \\ \times 5 \\ \hline \end{array}$ | 35) $\begin{array}{r} \$700.89 \\ \times 8 \\ \hline \end{array}$ |
| 36) $\begin{array}{r} \$210.43 \\ \times 7 \\ \hline \end{array}$ | 37) $\begin{array}{r} \$6,400.07 \\ \times 9 \\ \hline \end{array}$ | | | |

ASSIGNMENT 31

Multiply:

- | | | |
|-------------------|-------------------|-------------------|
| 1. 10×5 | 4. 10×14 | 7. 10×56 |
| 2. 10×7 | 5. 10×27 | 8. 10×92 |
| 3. 10×2 | 6. 10×38 | 9. 10×86 |
| 10. 20×6 | 13. 50×2 | 16. 20×6 |
| 11. 30×5 | 14. 50×2 | 17. 20×6 |
| 12. 40×3 | 15. 80×3 | 18. 70×5 |

ASSIGNMENT 32

Multiply:

1)
$$\begin{array}{r} 23 \\ \times 13 \\ \hline \end{array}$$

2)
$$\begin{array}{r} 34 \\ \times 22 \\ \hline \end{array}$$

3)
$$\begin{array}{r} 43 \\ \times 12 \\ \hline \end{array}$$

4)
$$\begin{array}{r} 32 \\ \times 22 \\ \hline \end{array}$$

5)
$$\begin{array}{r} 24 \\ \times 21 \\ \hline \end{array}$$

6)
$$\begin{array}{r} 34 \\ \times 12 \\ \hline \end{array}$$

7)
$$\begin{array}{r} 82 \\ \times 13 \\ \hline \end{array}$$

8)
$$\begin{array}{r} 41 \\ \times 28 \\ \hline \end{array}$$

9)
$$\begin{array}{r} 91 \\ \times 72 \\ \hline \end{array}$$

10)
$$\begin{array}{r} 82 \\ \times 73 \\ \hline \end{array}$$

11)
$$\begin{array}{r} 92 \\ \times 33 \\ \hline \end{array}$$

12)
$$\begin{array}{r} 53 \\ \times 41 \\ \hline \end{array}$$

13)
$$\begin{array}{r} 37 \\ \times 28 \\ \hline \end{array}$$

14)
$$\begin{array}{r} 96 \\ \times 49 \\ \hline \end{array}$$

15)
$$\begin{array}{r} 57 \\ \times 37 \\ \hline \end{array}$$

16)
$$\begin{array}{r} 98 \\ \times 85 \\ \hline \end{array}$$

17)
$$\begin{array}{r} 97 \\ \times 39 \\ \hline \end{array}$$

18)
$$\begin{array}{r} 58 \\ \times 27 \\ \hline \end{array}$$

19)
$$\begin{array}{r} 59 \\ \times 35 \\ \hline \end{array}$$

20)
$$\begin{array}{r} 73 \\ \times 59 \\ \hline \end{array}$$

21)
$$\begin{array}{r} 68 \\ \times 29 \\ \hline \end{array}$$

22)
$$\begin{array}{r} 69 \\ \times 26 \\ \hline \end{array}$$

23)
$$\begin{array}{r} 23 \\ \times 50 \\ \hline \end{array}$$

24)
$$\begin{array}{r} 58 \\ \times 40 \\ \hline \end{array}$$

25)
$$\begin{array}{r} 36 \\ \times 60 \\ \hline \end{array}$$

26)
$$\begin{array}{r} \$.43 \\ \times 70 \\ \hline \end{array}$$

27)
$$\begin{array}{r} \$.64 \\ \times 40 \\ \hline \end{array}$$

28)
$$\begin{array}{r} \$.49 \\ \times 50 \\ \hline \end{array}$$

29)
$$\begin{array}{r} 72 \\ \times 90 \\ \hline \end{array}$$

30)
$$\begin{array}{r} \$.93 \\ \times 90 \\ \hline \end{array}$$

31)
$$\begin{array}{r} \$.47 \\ \times 48 \\ \hline \end{array}$$

32)
$$\begin{array}{r} \$.78 \\ \times 35 \\ \hline \end{array}$$

33)
$$\begin{array}{r} \$.92 \\ \times 89 \\ \hline \end{array}$$

34)
$$\begin{array}{r} 67 \\ \times 82 \\ \hline \end{array}$$

35)
$$\begin{array}{r} 79 \\ \times 58 \\ \hline \end{array}$$

36)
$$\begin{array}{r} 83 \\ \times 27 \\ \hline \end{array}$$

37)
$$\begin{array}{r} 94 \\ \times 67 \\ \hline \end{array}$$

38)
$$\begin{array}{r} 62 \\ \times 59 \\ \hline \end{array}$$

39)
$$\begin{array}{r} 91 \\ \times 89 \\ \hline \end{array}$$

40)
$$\begin{array}{r} 27 \\ \times 38 \\ \hline \end{array}$$

41)
$$\begin{array}{r} 34 \\ \times 91 \\ \hline \end{array}$$

42)
$$\begin{array}{r} 46 \\ \times 40 \\ \hline \end{array}$$

43)
$$\begin{array}{r} 57 \\ \times 42 \\ \hline \end{array}$$

44)
$$\begin{array}{r} 65 \\ \times 22 \\ \hline \end{array}$$

45)
$$\begin{array}{r} 16 \\ \times 28 \\ \hline \end{array}$$

46)
$$\begin{array}{r} 29 \\ \times 18 \\ \hline \end{array}$$

47)
$$\begin{array}{r} 39 \\ \times 57 \\ \hline \end{array}$$

48)
$$\begin{array}{r} 86 \\ \times 99 \\ \hline \end{array}$$

49)
$$\begin{array}{r} 47 \\ \times 59 \\ \hline \end{array}$$

50)
$$\begin{array}{r} 83 \\ \times 83 \\ \hline \end{array}$$

K. Word Problems (Carrying)**(SUGGESTIONS FOR TEACHING ASSIGNMENT 33)**

In Section F word problems involving multiplication were explained.

Review the ideas in that section before beginning Assignment 33.

L. Six- and Seven-Place Numbers**(SUGGESTIONS FOR TEACHING ASSIGNMENT 34)**

In the first unit our number system was explained up to ten-thousands (five-place numbers.) There are problems in multiplication which should be studied in Basic Mathematics which lead to six-place numbers.

Example: 972×857 .) Also in today's world the use of seven-place numbers (millions) has become very common.

Cite several examples of 6- and 7-place numbers that the student might be familiar with.

Six-place numbers:

1. Tellers at a bank count very fast, but a teller would take about 5 working days to count \$250,000 in \$1 bills.
2. Counting at the rate of two numbers a second (very fast) it would take over $13\frac{1}{2}$ hours to count to 100,000.

Seven-place numbers:

1. If your step measured 2 feet, you would walk 379 miles in making one million steps. That's equal to the distance from Chicago to Cleveland, Ohio.
2. If you live on a busy street where 1,000 cars a day pass by, it would take a little less than 3 years for one million cars to pass your home.

Extend the number chart which was used previously to cover 6 and 7-place numbers.

Millions' Group			Thous- ands' Group			Ones' Group		
		ones	hundreds	tens	ones	hundreds	tens	ones
			2	3	5	8	7	1
				7	2	9	8	3
			4	7	9	3	0	4
		2	7	5	8	9	6	5
		8	3	4	2	7	8	2
		6	2	0	0	9	0	2

Fill the numbers into the table and explain the reading of the numbers to the students. In reading and writing numbers remind the students of these points:

1. The name of the group is said only at the end of the group.
2. The word "and" is used only when you have a whole number and a decimal (or dollars and cents).
3. Insert commas at the end of each group.

Assignment 34 contains problems in addition and subtraction of 6- and 7-place numbers.

M. Three-Place Multipliers

(SUGGESTIONS FOR TEACHING ASSIGNMENT 35)

Before multiplying by three-place numbers review the method of multiplying by two-place numbers.

	Multiply by ones	Multiply by tens	Add the products
243	243	243	972
<u>x 24</u>	<u>x 4</u>	<u>x 20</u>	<u>4860</u>
972 ←	972	4860	5832
<u>4860</u> ←			
5832 ←			

When we multiply a whole number by 100, we put two zeros at the right of the number.

$$100 \times 6 = 600$$

compute $100 \times 8 = 800$

$$100 \times 12 = 1,200$$

$$100 \times 23 = 2,300$$

200 x 6 means 2 hundreds x 6 = 12 hundreds, or 1,200

400 x 8 means 4 hundreds x 8 = 32 hundreds, or 3,200

Putting the two ideas presented above together, it is now possible to explain three-place multiplication.

	Multiply by ones	Multiply by tens	Multiply by hundreds	Add the partial products
343	343	343	343	1,029
$\times 423$	$\times 3$	20	400	6,860
1029	1,029	6860	137,200	137,200
6860				145,089
137200				
145,089				

Several examples of this type should be worked on the blackboard. The end zeros in the second and third partial products (6,860 and 137,200) may be dropped when the students have sufficient understanding of the process.

4	0	2	0	7	4		
7	2	0	8	2	7	5	
2	8	7	5	4	2	8	
8	0	2	0	0	5	8	

ASSIGNMENT 33

1. Mr. Levin bought each of his 3 boys a pair of shoes at \$6.95 a pair. How much did the shoes cost?
2. Edward told his father he could read 215 words a minute. How many words can be read in 15 minutes?
3. Find the cost of the items in the problems below:
 - a. 43 stamps at 4 each _____
 - b. 57 books at 50 each _____
 - c. 65 tickets at \$1.65 each _____
 - d. 6 baseballs at \$1.50 each _____
4. Twelve boys each passed out 125 handbills for a local grocery store. In all, how many handbills did they pass out?
5. A postman walks 13 miles a day. How far does he walk in 24 days?
6. Eddie earns \$1.05 a day for delivering newspapers. How much does he earn in a 7-day week?
7. Mr. Helm drives his car 248 miles a day. How far will he drive in 4 days?
8. The Lee family decided to put a fence around their house. A certain kind of fence costs \$4.93 a section. They will need 24 sections. How much will it cost?
9. If Peter buys a fishing rod for \$7.95 and he gives the man in the store a twenty dollar bill, how much change will Peter get?
10. A train that travels 55 miles an hour reaches Chicago in 4 hours. How many miles does it travel on the trip?
11. In an assembly hall there are 36 rows of seats with 22 seats in each row. How many seats are there in the assembly hall?
12. Mrs. Russell bought 4 yards of material at \$.98 a yard. How much did the material cost?
13. The number of balls used in a major league baseball game is approximately 48. If a baseball costs \$2.89, what is the cost of 48 balls?
14. Rugs, carpets, and linoleum are sold by the square yard. To find the cost you multiply the cost for one square yard by the number of square yards. Example: What is the cost of 7 square yards of carpeting at \$7.98 a square yard?
 Solution: $\begin{array}{r} \$7.98 \\ \times 7 \\ \hline \$55.86 \end{array}$
 In each of the following examples find the cost of:
 - a. 8 square yards of carpeting at \$6.98 a square yard.
 - b. 12 square yards of linoleum at \$1.95 a square yard.
 - c. 15 square yards of carpeting at \$9.95 a square yard.

15. The monthly payments to be made by Mr. Hill on his home are \$78.45.
 - a. How much will he pay in one year?
 - b. If it takes Mr. Hill 20 years to pay for his home, how much will he pay in 20 years?
16. A clerk in a bookstore sold 40 copies of a book that was priced at \$2.25. What was the total amount received for the 40 copies?
17. Mr. Clifford sold 105 bushels of dirt for \$.75 a bushel. How much did he receive for the dirt?
18. A television repair man made 36 service calls in one week. The charge for each call was \$5.00. How much did he receive for all the calls?
19. The television repair man also installed 17 antennas during the week. He charged \$25. for each one. How much did he receive for installing the antennas?
20. In a big city apartment development there are 6 buildings. Each building has 21 floors and on each floor there are 8 apartments. How many apartments are there in all?
21. If there are 4 people in each apartment in Problem 20 how many people live there altogether?
22. Henry put \$7.75 in the bank each month for 6 months. How much did he put in the bank in all?
23. Mr. Wallace earns \$360 a month. How much does he earn in 6 months?
24. A movie house has 50 rows of seats, with 28 seats in each row. How many seats are there in all?
25. A school board purchased 57 sets of reference books at \$69.75 a set. How much did the books cost?
26. An airplane pilot travels 1,530 miles on a trip. How many miles will he travel on 23 trips?
27. Mr. Anderson is a salesman and he drives 2,350 miles a month. How many miles does he drive in a year?
28. Mr. Miller bought a used car. The dealer told him he could pay \$59.75 per month for 12 months. How much would the car cost on this plan?
29. On May 13, 1957, a jet plane flew non-stop from London to Los Angeles at a rate of 480 miles per hour. How far did the jet travel in 12 hours?
30. A case of milk holds 24 cartons. How many cartons are there in 16 cases?
31. A furniture store received a shipment of 12 cartons of chairs. Each carton had 10 chairs in it. How many chairs were there in all?
32. A television manufacturing company turns out 127 sets a day.
 - a. How many sets are manufactured in a five-day week?
 - b. How many sets are manufactured in a year (52 weeks, 5 days a week)?
33. It is 714 airline miles from Chicago to New York. One airline makes this trip 12 times a day. Find the total number of miles traveled by this line between Chicago and New York in a day?

ASSIGNMENT 34

1) Read each of the numbers in the chart below:

Millions' Group			Thous- ands' Group			Ones' Group		
hundreds	tens	ones	hundreds	tens	ones	hundreds	tens	ones
			2	4	6	8	9	2
			8	6	3	4	2	9
			9	6	8	6	3	9
	2		7	4	2	8	9	6
	3		5	8	4	9	0	2
			6	0	0	0	5	8
	8		0	7	0	0	0	6

2) Make a chart like the one in Problem 1 and write the following numbers in the chart.

- a. 568,342 c. 3,856,952 e. 503,907 g. 5,077,009
- b. 98,583 d. 9,643,777 f. 800,073 h. 3,900,900
- i. Four hundred eight thousand nine
- j. One million six hundred forty thousand seven hundred

3) Place commas correctly in each number below:

- a. 372854 d. 8900005 g. \$63892.02 j. \$3000000
- b. 9863874 e. 6000006 h. \$20076.02 k. \$9000000
- c. 634902 f. \$2743.5 i. \$690374.98 l. \$8000000.08

4) For each row below arrange the numbers in the order of size, beginning with the smallest:

- a. 13 130 103 133
- b. 670 706 607 760
- c. 2,345 3,245 4,325 4,532
- d. 48,962 94,682 49,269 84,296
- e. 100,101 101,001 110,010 100,011
- f. 3,100,100 3,010,001 3,110,000 3,000,101

Do the operation indicated in each problem:

$$\begin{array}{r} 5) \quad 247,634 \\ + \quad 543,978 \\ \hline \end{array}$$

$$\begin{array}{r} 6) \quad 987,654 \\ - \quad 298,748 \\ \hline \end{array}$$

$$\begin{array}{r} 7) \quad 638,947 \\ \quad 592,873 \\ \quad 800,008 \\ + \quad 907,650 \\ \hline \end{array}$$

$$\begin{array}{r} 8) \quad 2,439,772 \\ + \quad 6,894,006 \\ \hline \end{array}$$

$$\begin{array}{r} 9) \quad 7,654,832 \\ - \quad 2,892,999 \\ \hline \end{array}$$

- 10) The table below shows the population of the 5 largest cities in the United States (1950 Census).

New York	7,891,957
Chicago	3,620,962
Philadelphia	2,071,605
Los Angeles	1,970,358
Detroit	1,849,568

- Find the total number of people in all five cities.
- How many more people are there in New York than are in Chicago?
- How many more people are there in Philadelphia than are in Detroit?
- Are there as many people in Philadelphia and Los Angeles together as there are in Chicago?

ASSIGNMENT 35

Multiply:

$$\begin{array}{r} 1) \quad 345 \\ \quad 145 \\ \hline \end{array}$$

$$\begin{array}{r} 2) \quad 813 \\ \quad 749 \\ \hline \end{array}$$

$$\begin{array}{r} 3) \quad 654 \\ \quad 348 \\ \hline \end{array}$$

$$\begin{array}{r} 4) \quad 293 \\ \quad 137 \\ \hline \end{array}$$

$$\begin{array}{r} 5) \quad 463 \\ \quad 386 \\ \hline \end{array}$$

$$\begin{array}{r} 6) \quad \$7.86 \\ \quad 432 \\ \hline \end{array}$$

$$\begin{array}{r} 7) \quad \$6.32 \\ \quad 583 \\ \hline \end{array}$$

$$\begin{array}{r} 8) \quad \$9.71 \\ \quad 468 \\ \hline \end{array}$$

$$\begin{array}{r} 9) \quad \$6.53 \\ \quad 842 \\ \hline \end{array}$$

$$\begin{array}{r} 10) \quad \$9.98 \\ \quad 853 \\ \hline \end{array}$$

In the word problems that follow, read each problem carefully:

- In Chicago each week there are about 325 fires. At this rate, how many fires will there be in Chicago in a year?
- Fred's father sold 130 bushels of apples at \$2.65 a bushel. How much did he receive for them?
- In a school cafeteria 387 meals were served each day. At that rate, how many meals would be served in a school year of 178 days?
- The table below shows the number of people who attended major league games in these cities in 1957:

Brooklyn	1,026,148
Milwaukee	2,215,404
St. Louis	1,183,575
Cleveland	722,256

 Find the total attendance for these four cities.
- The Nautilus submarine cost \$55,000,000. The government is planning to purchase six such submarines. At this rate, how much would six cost?

N. Zero Multiplier

(SUGGESTIONS FOR TEACHING ASSIGNMENT 36)

As in other operations, zero can be a troublesome item in multiplication. In previous sections of this unit, the following operations involving zero have been taught:

1. Multiplication by ten

$$\begin{array}{r} 73 \\ 10 \\ \hline 730 \end{array} \quad \begin{array}{r} 29 \\ 10 \\ \hline 290 \end{array} \quad \begin{array}{r} 723 \\ 10 \\ \hline 7,230 \end{array} \quad \begin{array}{r} 989 \\ 10 \\ \hline 9,890 \end{array}$$

2) Multiplication by one hundred

$$\begin{array}{r} 567 \\ 100 \\ \hline 56,700 \end{array} \quad \begin{array}{r} 893 \\ 100 \\ \hline 89,300 \end{array} \quad \begin{array}{r} 987 \\ 100 \\ \hline 98,700 \end{array}$$

In doing these problems, zero was never a multiplier. It was considered a place holder and to indicate none or not any of that particular unit. It would be well to put a group of problems like those above on the blackboard and go over these points with the students.

Combinations of zeros in both multiplicand and multiplier have to be considered very carefully. Do the following examples at the blackboard before assigning Assignment 36.

$$\begin{array}{r} 206 \\ 30 \\ \hline 6,180 \end{array} \quad \begin{array}{r} 907 \\ 90 \\ \hline 81,630 \end{array} \quad \begin{array}{r} 800 \\ 60 \\ \hline 48,000 \end{array}$$

$$\begin{array}{r} 920 \\ 700 \\ \hline 644,000 \end{array} \quad \begin{array}{r} 505 \\ 800 \\ \hline 404,000 \end{array} \quad \begin{array}{r} 800 \\ 908 \\ 6400 \\ \hline 72000 \\ 726,400 \end{array}$$

O. Review of Addition, Subtraction, and Multiplication

(SUGGESTIONS FOR TEACHING ASSIGNMENTS 37 and 38)

The problems in Assignment 37 are intended to review the three fundamental operations studied up to this point. As was stated previously at the end of the unit on subtraction, students in Basic Mathematics need a great deal of review work.

The activities in Assignment 38 are intended to give more review in the fundamental operations.

ASSIGNMENT 36

Multiply:

$$\begin{array}{r} 1) \quad 209 \\ \quad 38 \\ \hline \end{array}$$

$$\begin{array}{r} 2) \quad 108 \\ \quad 43 \\ \hline \end{array}$$

$$\begin{array}{r} 3) \quad 506 \\ \quad 29 \\ \hline \end{array}$$

$$\begin{array}{r} 4) \quad 707 \\ \quad 58 \\ \hline \end{array}$$

$$\begin{array}{r} 5) \quad 27 \\ \quad 40 \\ \hline \end{array}$$

$$\begin{array}{r} 6) \quad 54 \\ \quad 80 \\ \hline \end{array}$$

$$\begin{array}{r} 7) \quad 270 \\ \quad 756 \\ \hline \end{array}$$

$$\begin{array}{r} 8) \quad 905 \\ \quad 284 \\ \hline \end{array}$$

$$\begin{array}{r} 9) \quad 963 \\ \quad 802 \\ \hline \end{array}$$

$$\begin{array}{r} 10) \quad 872 \\ \quad 408 \\ \hline \end{array}$$

$$\begin{array}{r} 11) \quad \$8.70 \\ \quad 653 \\ \hline \end{array}$$

$$\begin{array}{r} 12) \quad \$6.09 \\ \quad 428 \\ \hline \end{array}$$

$$\begin{array}{r} 13) \quad \$2.43 \\ \quad 709 \\ \hline \end{array}$$

$$\begin{array}{r} 14) \quad \$6.07 \\ \quad 808 \\ \hline \end{array}$$

$$\begin{array}{r} 15) \quad 643 \\ \quad 700 \\ \hline \end{array}$$

$$\begin{array}{r} 16) \quad 987 \\ \quad 400 \\ \hline \end{array}$$

$$\begin{array}{r} 17) \quad 239 \\ \quad 900 \\ \hline \end{array}$$

$$\begin{array}{r} 18) \quad \$7.80 \\ \quad 500 \\ \hline \end{array}$$

$$\begin{array}{r} 19) \quad \$5.98 \\ \quad 800 \\ \hline \end{array}$$

$$\begin{array}{r} 20) \quad \$7.00 \\ \quad 900 \\ \hline \end{array}$$

ASSIGNMENT 37

1. Add 3,784 to each number below.

a. 852

b. 603

c. 3,784

d. 9,006

2. Subtract 7,462 from each number below.

a. 8,489

b. 9,702

c. 10,003

d. 14,000

3. Multiply each of the following numbers by 9:

$$\begin{array}{r} 4. \quad 2.46 \\ \quad \times 7 \\ \hline \end{array}$$

$$\begin{array}{r} 5. \quad 5.35 \\ \quad - 3.83 \\ \hline \end{array}$$

$$\begin{array}{r} 6. \quad \$8.32 \\ \quad - 8.07 \\ \hline \end{array}$$

$$\begin{array}{r} 7. \quad 3,147 \\ \quad + 906 \\ \hline \end{array}$$

$$\begin{array}{r} 8. \quad \$43.75 \\ \quad 4.56 \\ \quad 5.17 \\ \quad + 9.84 \\ \hline \end{array}$$

$$\begin{array}{r} 9. \quad 9,631 \\ \quad 4,382 \\ \quad + 6,183 \\ \hline \end{array}$$

$$\begin{array}{r} 10. \quad 6404 \\ \quad - 294 \\ \hline \end{array}$$

$$\begin{array}{r} 11. \quad \$83.26 \\ \quad - 19.63 \\ \hline \end{array}$$

$$\begin{array}{r} 12. \quad 58,271 \\ \quad 33,303 \\ \quad 95,638 \\ \quad + 73,277 \\ \hline \end{array}$$

$$\begin{array}{r} 13. \quad 27,000 \\ \quad 594 \\ \quad 678 \\ \quad + 1,436 \\ \hline \end{array}$$

$$\begin{array}{r} 14. \quad 49,623 \\ \quad - 28,741 \\ \hline \end{array}$$

$$\begin{array}{r} 15. \quad 26,000 \\ \quad - 14,734 \\ \hline \end{array}$$

$$\begin{array}{r} 16. \quad 263,416 \\ \quad - 183,217 \\ \hline \end{array}$$

$$\begin{array}{r} 17. \quad 132,000 \\ \quad - 26,435 \\ \hline \end{array}$$

$$\begin{array}{r} 18. \quad \$1704.70 \\ \quad - 863.87 \\ \hline \end{array}$$

19. $\begin{array}{r} \$58.60 \\ 20.83 \\ 3.40 \\ 40.00 \\ + 9.07 \\ \hline \end{array}$
20. $\begin{array}{r} 7262 \\ -3846 \\ \hline \end{array}$
21. 84×803
22. $30 \times \$.89$
23. $\begin{array}{r} 5,709 \\ 20,627 \\ 2,584 \\ 8,653 \\ 83,902 \\ +38,590 \\ \hline \end{array}$
24. $\begin{array}{r} 6,890,910 \\ -4,049,087 \\ \hline \end{array}$
25. $\begin{array}{r} 10,531 \\ \times 206 \\ \hline \end{array}$
26. $\begin{array}{r} \$68.98 \\ 7.85 \\ 234.59 \\ +85.64 \\ \hline \end{array}$
27. $\begin{array}{r} 5010 \\ -4989 \\ \hline \end{array}$
28. $\begin{array}{r} 3008 \\ \times 406 \\ \hline \end{array}$
29. $\begin{array}{r} 66 \\ 9116 \\ 755 \\ 95 \\ 4500 \\ \hline \end{array}$
30. $\begin{array}{r} 50,040 \\ 49,865 \\ 3,348 \\ + 760 \\ \hline \end{array}$
31. $\begin{array}{r} 950,745 \\ -761,006 \\ \hline \end{array}$
32. $\begin{array}{r} \$800.00 \\ -125.67 \\ \hline \end{array}$
33. $\begin{array}{r} 706 \\ \times 30 \\ \hline \end{array}$
34. $\begin{array}{r} 6000 \\ \times 63 \\ \hline \end{array}$
35. $\begin{array}{r} \$5.09 \\ 376 \\ \hline \end{array}$
36. $6,484 + 39 + 3,408 + 16$
37. From 42,138 take 25,416
38. Multiply 2,078 by 60
39. $\begin{array}{r} \$591.63 \\ 733.11 \\ + 921.04 \\ \hline \end{array}$
40. $\begin{array}{r} 21,817 \\ -12,999 \\ \hline \end{array}$
41. $\begin{array}{r} \$6,530.62 \\ + 3,139.29 \\ \hline \end{array}$
42. $\begin{array}{r} 34,589 \\ \times 7 \\ \hline \end{array}$
43. $\begin{array}{r} \$57.86 \\ \times 70 \\ \hline \end{array}$
44. $\begin{array}{r} 963 \\ \times 487 \\ \hline \end{array}$
45. $\begin{array}{r} \$6.43 \\ \times 308 \\ \hline \end{array}$
46. $\begin{array}{r} 3,742,896 \\ 5,246,982 \\ +1,003,007 \\ \hline \end{array}$
47. $\begin{array}{r} 700 \\ \times 800 \\ \hline \end{array}$
48. $\begin{array}{r} 2,072,053 \\ 1,246,096 \\ 3,152,002 \\ +1,793,698 \\ \hline \end{array}$
49. $\begin{array}{r} \$6.50 \\ \times 900 \\ \hline \end{array}$
50. $\begin{array}{r} 7,000,000 \\ -2,643,972 \\ \hline \end{array}$

Read each word problem carefully. In some problems it is necessary to do more than one operation.

51. In each problem write A, S, or M after each problem to indicate whether to add, subtract, or multiply.
 - a. If 383 of the 550 children in a school eat lunch in the cafeteria, how many do not eat in the cafeteria? _____
 - b. The cafeteria sold 298 sandwiches on Monday, 307 on Tuesday, and 316 on Wednesday. How many were sold on the three days? _____
 - c. Tom bought nine lunch tickets which cost \$.85 each. How much did he pay for them? _____
52. The owner of a grocery store took in \$87.53 in a day. The goods he sold cost him \$67.93. Other costs for the day came to \$8.23. What was his profit for the day?
53. The grocery store owner in Problem 52 bought 24 cans of peas for \$3.65. He sold them at 15¢ a can. How much more than the cost did he receive for the peas?
54. Three men went to the Bears-Cardinals football game. One man bought all three tickets for \$3.65 each. How much did he pay?
55. Mary can read 189 words a minute. Helen can read 73 more words per minute than Mary. How many words a minute can Helen read?
56. The Robinson family bought a new television set. They received \$75 for their old set when they bought the new set which was priced at \$273. How much cash did they have to pay?
57. A school library has 843 history books, 58 picture books, 248 travel books, 2,860 storybooks, and 1,003 books of other kinds. How many books are there in the library?
58. In Problem 57 how many more storybooks are there than history books?
59. Mr. Snyder picked 65 quarts of cherries on his farm. His wife canned 39 quarts and Mr. Snyder sold the rest for 37¢ a quart. How much money did Mr. Snyder get for the cherries?
60. George wants to buy two books for \$1.50 and \$1.65. He has only \$2.15. How much more money does he need?
61. Harry's mother sent him to the store to buy 3 bags of potato chips at 31¢ a bag. How much change should he receive from a dollar?
62. Kenneth bought 6 dozen hot-dog rolls at 43¢ a dozen and a large jar of mustard for 19¢. How much did he spend?
63. Mrs. McCarthy bought 7 yards of material at \$.79 a yard and 3 spools of thread at 10¢ each. How much did she spend?
64. In Problem 63, how much change would Mrs. McCarthy get from a ten-dollar bill?

65. There were 15,850 miles of railroad in Texas and 10,029 miles in Pennsylvania. How many more miles were there in Texas than in Pennsylvania?
66. A family of 4 went on a boat trip on Lake Michigan. The boat fare for each person was \$76.25. What was the cost of the trip for the family?
67. The monthly installment payments made by Mr. and Mrs. Russell are as follows: \$12.50 for a TV set, \$89.00 for their home, \$8.75 for their refrigerator and \$7.50 for a washing machine. What is the total of the Russell's monthly payments?
68. If Mr. Russell's (in Problem 67) take-home pay is \$475.00 each month, how much is left after making all his monthly payments?
69. Mr. Gray had \$37.50 when he went shopping. His purchases amounted to \$14.03. How much did he have left?
70. When you pay cash for an item instead of buying it on the installment plan you save money. The table below shows the cash price and installment price of each item. Find the savings by paying cash for each item.

Item	Cash Price	Installment Price	Savings by Paying cash
a. TV set	\$149	\$179.50	
b. Stove	\$129	\$145.62	
c. Electric iron	\$14.95	\$18.50	
d. Washing machine	\$269.95	\$294.05	
e. Refrigerator	\$189	\$203.51	

71. What is the total cost of four chairs at \$13.75 each and three others at \$26.50 each?
72. What is the total cost of 2 jars of cold cream at \$1.25 a jar, a box of stationary at \$.95, and a box of candy at \$1.75?
73. At the motor scooter shop, Henry bought a horn for \$1.89 and a new brake pedal for \$2.25. How much change should he receive from a five-dollar bill?
74. Pike's Peak in Colorado is 14,110 feet high. Mount McKinley in Alaska is 20,320 feet high. Mount McKinley is how much higher than Pike's Peak?
75. A school bought 3 flags at \$7.95 each. How much did they pay for the flags?
76. Jim has put \$2.85 in the bank each week for 20 weeks. Has he put enough money in the bank to buy a bicycle which costs \$47.68?

77. Mr. Robinson's electric bill was \$9.73. His gas bill was \$7.94. How much more was his electric bill than his gas bill?
78. A plane traveled 250 miles per hour for 12 hours. How far did the plane travel?
79. The Carter family bought a new refrigerator. The payments were \$16.80 a month for 18 months. How much did the refrigerator cost?
80. There are 5,280 feet in a mile. How many feet are there in 17 miles?
81. A farmer bought a farm of 135 acres at \$250.00 an acre. How much did he pay for the farm?
82. Charles earned \$9.75 a week working at a supermarket and \$6.50 a week selling newspapers. How much did he earn in 7 weeks?
83. One of our Western cities is 7,150 feet above sea level. Another is 4,251 feet above sea level. What is the difference between the heights of the two cities?
84. Mr. Gerard saved \$.85 on his electric bill by paying promptly. The bill was \$8.15. How much did Mr. Gerard pay?
85. To outfit a basketball team a school purchased the following equipment:
- 22 pairs of gym shoes at \$6.45 a pair
 - 44 pairs of socks at \$.79 a pair
 - 22 gym suits at \$12.95 each
- How much did the school pay for all the equipment?
86. Answer each question with the word addition, subtraction, or multiplication.
- a. What is the shortest way to put together or combine groups that are all of the same size?
 - b. If we know the cost of one item how do we find the cost of more than one item?
 - c. What do we do when we wish to put unequal groups together to get a larger group?
 - d. What do we do when we wish to find how much larger one number is than another?
87. The student fare on the CTA is 13¢ if the student has his CTA identification card. If a student rides to and from school each day find:
- a. How much it costs per day?
 - b. How much it costs per week?
 - c. How much it costs per school year (40 weeks per year)?
88. A bus has 4 seats that have space for 5 people on each seat and 14 seats that have space for 2 people on each seat. How many people can be seated in the bus?

89. "As I was going to St. Ives
I met a man with seven wives.
Each wife had seven socks.
In each sock were seven cats.
Each cat had seven kittens.
Kittens, cats, socks, and wives.
How many were going to St. Ives?"

90. A jet plane flew 445 miles an hour for 4 hours. The plane carried enough fuel for 2,500 miles of flying. How many more miles could the plane go before refueling?

91. Cement is packaged in 45-pound and 90-pound bags. Mr. Hall bought three 45-pound bags and two 90-pound bags. How many pounds of cement did he purchase?

92. A special ticket for all 20 rides at the amusement park costs \$3.00. Separately each ride costs 20¢. How much do you save if you buy the special tickets?

93. Find the total amount of the purchases listed below:

2 skirts at \$3.98 each
4 ties at \$.79 each
1 pair of shoes at \$12.95 a pair

94. The new postage rates are 4¢ for a first class letter and 7¢ for airmail. What is the cost of 23 four-cent stamps and 9 airmail stamps?

ASSIGNMENT 38

ACTIVITIES

1. Fill in the puzzle.

1	2		3		4		5
6		7			8		
		9		10			
	11			12		13	
14			15			16	17
18		19			20		
		21		22		23	
24				25			

Across

1. 4×7
3. 41×21
6. $10,000 - 6,810$
8. 25×10
9. $10,000 - 1,510$
11. 30×3
12. 13×15
14. 5×5
15. 10×2
16. 7×3
18. $6,932 - 5,840$

Down

1. $853 - 616$
2. 9×9
3. $60 + 124 + 620$
4. $89 + 203 + 907 + 10$
5. 42×12
7. 49×20
10. $53 + 441 + 416$
11. $1,700 - 750$
13. $100,000 - 47,835$
14. 36×59
15. $901 - 679$

17. 43×33
19. 5×182
22. $6 \times 2 + 1$

DIVISION OF WHOLE NUMBERS

A. Meaning of Division

(SUGGESTIONS FOR TEACHING ASSIGNMENT 39)

Division is the most difficult of the four fundamental operations.

When division is taught as a manipulative process which lacks meaning the student is almost sure to have difficulties. A recent study revealed 57 different types of errors when the divisor was a one-place number.

Pupils need to review the two meanings of division:

1. Find the number of small groups, all the same size, that are contained in a larger group.
2. Find how many there are in each small group when you make a certain number of equal small groups from a larger group.

Students do not have to be able to put these into the exact words used above but they should be able to differentiate between the two kinds of division. Examples will bring out the idea.

Find the number of small groups	Find how many there are in each small group
1. John had 24 books and he put 8 books in each box. How many boxes did he need?	1. John had 24 books and he put them in 3 boxes. How many books did he put in each box.
2. If a piece of string 40 inches long is divided into pieces 10 inches long, how many pieces will there be?	2. If a piece of string 40 inches long is divided into 4 pieces, how long is each piece?

B. Basic Division Facts (Even Facts)

(SUGGESTIONS FOR TEACHING ASSIGNMENT 40)

The first step in division is the mastery of the basic division facts. The 90 basic facts in division represent the even division facts (including division by 1). There are 360 uneven division groupings such as $3/\overline{14}$ and $7/\overline{43}$. The teacher who gives practice only on

even facts apparently assumes that learning them will automatically assume the learning of the uneven facts. This is obviously an unjustifiable assumption.

If the student has mastered the multiplication facts, then it is possible to teach the basic division facts. It would be well for the teacher to take a number of the division facts and explain them carefully so that there is meaning to the division process.

As an example, use the problem $4/\overline{12}$.

1. Show the meaning of the problem by a drawing.

(1111) (1111) (1111) The drawing shows that there are 3 groups of 4 in 12.

2. Have the pupil state the problem verbally.

"There are three 4's in 12."

3. Have the pupil find the answer the long way, that is by subtraction.

$$\begin{array}{r}
 12 \\
 -4 \quad 1 \text{ four} \\
 \hline
 8 \\
 -4 \quad 2 \text{ fours} \\
 \hline
 4 \\
 -4 \quad 3 \text{ fours} \\
 \hline
 0
 \end{array}$$

If this procedure is followed for several examples then there is meaning to division.

Practice with the division facts should be conducted as was done in the other operations. Again it is better to practice a few minutes each day over a long period of time rather than to devote entire class periods to practice.

Before doing the assignment on the basic division facts the position of the numbers in the quotient should be explained carefully.

The placement of the quotient presents no problem when a one-place number is divided as in the example $3/\overline{6}$. When the number divided has two places as in the example, $3/\overline{12}$, the student should understand why the 4 is written over the 2.

To explain this, break the divided 12 down into its parts.

$$\begin{aligned}
 12 &= 1 \text{ ten and } 2 \text{ ones} \\
 &= 10 \text{ ones} + 2 \text{ ones} = 12 \text{ ones}
 \end{aligned}$$

When you divide the 12 ones into 3 equal groups there are 4 ones in each group. Since the 4 is 4-ones it must be placed in the ones' place in the quotient (which is above the 2). The pupil should never be permitted to place the 4 over the 1 or between the 1 and 2. An understanding of the placement of the quotient figure at this stage will prevent many later errors in division (especially with zeros.)

C. Basic Division Facts (Uneven facts)

(SUGGESTIONS FOR TEACHING ASSIGNMENT 41)

As was mentioned previously there are 360 uneven division facts when the divisor is a one-place number. These uneven division facts result in remainders. It is well to show several examples such as the following so that the remainder is understood.

$$\begin{array}{r} 2 \text{ r}2 \\ 3 \overline{)8} \\ \underline{6} \\ 2 \end{array}$$

Dividing 8 into 3 equal groups we obtain

$$\textcircled{111} \textcircled{111} 11$$

The amount that is left over is the remainder.

At the beginning it is beneficial to write out the steps of the division.

The form in which the remainder is written depends on the situation presented in the problem. Examples:

1. A piece of rope 7 ft. long is divided into three equal pieces. How long is each piece?

$$\begin{array}{r} 2\frac{1}{3} \text{ ft.} \\ 3 \overline{)7} \end{array}$$

2. Twelve pencils are distributed equally among 5 boys. How many pencils does each receive?

$$\begin{array}{r} 2 \text{ r}2 \\ 5 \overline{)12} \end{array}$$

The form in which the remainder is written depends on the situation. To reduce the danger of confusion in the early stages of division, the simplest form is the one in which the remainder is written as a remainder.

D. One-Place Divisor

(SUGGESTIONS FOR TEACHING ASSIGNMENT 42)

Division by a one-place number should be explained carefully since it forms the basis for all the work in division.

$$\begin{array}{r} 12 \\ 2 \overline{)24} \\ \underline{24} \\ 0 \end{array}$$

$$\begin{array}{r} 12 \\ 2 \overline{)24} \\ \underline{24} \\ 0 \end{array}$$

$$\begin{array}{r} 12 \\ 2 \overline{)24} \\ \underline{24} \\ 0 \end{array}$$

To explain the process we go back again to the meaning of the number system. Use the example below to illustrate.

$$2 \overline{) 46}$$

$$\begin{array}{r} 2 \text{ tens } 3 \text{ ones} = 23 \\ 2 \overline{) 4 \text{ tens } 6 \text{ ones}} \\ \underline{4 \text{ tens}} \\ 6 \text{ ones} \\ \underline{6 \text{ ones}} \end{array}$$

The first example involves even division facts. By breaking the numbers into parts then the placement of the digits in the quotient makes sense. It is important to stress place value.

$$2 \overline{) 54}$$

$$\begin{array}{r} 2 \text{ tens } 7 \text{ ones} = 27 \\ 2 \overline{) 5 \text{ tens } 4 \text{ ones}} \\ \underline{4 \text{ tens}} \\ 1 \text{ ten} = \underline{10 \text{ ones}} \\ \underline{14 \text{ ones}} \\ 14 \text{ ones} \end{array}$$

The second involves uneven division facts. When you divide the 5 tens into 2 equal parts there are 2 tens and 1 ten left over. To divide we change the 1 ten left over to 10 ones and combined with the 4 ones makes 14 ones. We now divide $\frac{7 \text{ ones}}{2 \overline{) 14 \text{ ones}}}$

It is advisable to write this as a separate example.

A number of examples such as the following should be worked out carefully with the students to provide understanding in division.

$$3 \overline{) 57}$$

$$\begin{array}{r} 1 \text{ ten } 9 \text{ ones} = 19 \\ 3 \overline{) 5 \text{ tens } 7 \text{ ones}} \\ \underline{3 \text{ tens}} \\ 2 \text{ tens} = \underline{20 \text{ ones}} \\ \underline{27 \text{ ones}} \\ 27 \text{ ones} \end{array}$$

$$6 \overline{) 192}$$

$$\begin{array}{r} 0 \text{ hundreds } 3 \text{ tens } 2 \text{ ones} = 32 \\ 6 \overline{) 1 \text{ hundred } 9 \text{ tens } 2 \text{ ones}} \\ \underline{0 \text{ hundreds}} \\ 1 \text{ hundred} = \underline{10 \text{ tens}} \\ \underline{19 \text{ tens}} \\ 18 \text{ tens} \\ 1 \text{ ten} = \underline{10 \text{ ones}} \\ \underline{12 \text{ ones}} \\ 12 \text{ ones} \end{array}$$

$$4 \overline{) 92}$$

$$\begin{array}{r} 2 \text{ tens } 3 \text{ ones} = 23 \\ 4 \overline{) 9 \text{ tens } 2 \text{ ones}} \\ \underline{8 \text{ tens}} \\ 1 \text{ ten} = \underline{10 \text{ ones}} \\ \underline{12 \text{ ones}} \\ 12 \text{ ones} \end{array}$$

To work toward the short form it is well to work the problem in three ways.

$$5 \overline{) 65}$$

$$\begin{array}{r} 1 \text{ ten } 3 \text{ ones} = 13 \\ 5 \overline{) 6 \text{ tens } 5 \text{ ones}} \\ \underline{5 \text{ tens}} \\ 1 \text{ ten} = \underline{10 \text{ ones}} \\ \underline{15 \text{ ones}} \\ 15 \text{ ones} \end{array}$$

	TENS	ONES
5	1	3
5	6	5
5	5	
1	1	5
1	1	5

$$\begin{array}{r} 13 \\ 5 \overline{) 65} \\ \underline{5} \\ 15 \\ \underline{15} \end{array}$$

Elimination of all the steps should not be done with the group in Basic Mathematics

ASSIGNMENT 39

53

In each problem below are you:

1. Finding the number of small groups or
2. Finding the number in each small group

Do not solve the problems.

1. There are 9 men on a baseball team. How many teams can you form with 45 men?
2. How many men are there on a baseball team if 20 men make 4 teams?
3. How many pieces of wood 2 feet long can you cut from a board 16 feet long?
4. There are 975 pupils in the Anderson school. If 25 pupils are in each room, how many rooms are occupied by pupils?
5. There are 365 days in a year. If there are 7 days in a week, how many weeks are there in a year?
6. John has \$6.25, and he plans to give each of his 5 brothers an equal amount of the money. How much money will each brother receive?
7. In an office there are 42 secretaries and 7 typewriters. How many secretaries are there for each typewriter?
8. In a football game there are 22 players on the field. How many players are on each team?

ASSIGNMENT 40

Divide:	a	b	c	d	e	f
1.	$8\sqrt{24}$	$6\sqrt{18}$	$3\sqrt{6}$	$7\sqrt{21}$	$8\sqrt{64}$	$7\sqrt{63}$
2.	$9\sqrt{54}$	$7\sqrt{56}$	$2\sqrt{2}$	$1\sqrt{2}$	$2\sqrt{6}$	$6\sqrt{24}$
3.	$1\sqrt{1}$	$7\sqrt{14}$	$8\sqrt{16}$	$5\sqrt{5}$	$3\sqrt{9}$	$1\sqrt{4}$
4.	$4\sqrt{20}$	$5\sqrt{20}$	$3\sqrt{12}$	$7\sqrt{28}$	$4\sqrt{8}$	$5\sqrt{15}$
5.	$4\sqrt{16}$	$7\sqrt{7}$	$9\sqrt{18}$	$8\sqrt{32}$	$9\sqrt{9}$	$9\sqrt{45}$
6.	$7\sqrt{35}$	$1\sqrt{6}$	$2\sqrt{10}$	$6\sqrt{36}$	$5\sqrt{40}$	$1\sqrt{9}$
7.	$8\sqrt{56}$	$6\sqrt{48}$	$5\sqrt{30}$	$2\sqrt{16}$	$1\sqrt{7}$	$3\sqrt{27}$
8.	$6\sqrt{54}$	$3\sqrt{18}$	$3\sqrt{15}$	$1\sqrt{5}$	$5\sqrt{35}$	$7\sqrt{49}$
9.	$9\sqrt{81}$	$9\sqrt{63}$	$4\sqrt{28}$	$3\sqrt{24}$	$4\sqrt{36}$	$7\sqrt{56}$
10.	$2\sqrt{12}$	$6\sqrt{42}$	$8\sqrt{48}$	$9\sqrt{54}$	$9\sqrt{72}$	$8\sqrt{56}$

ASSIGNMENT 41

Divide:	a	b	c	d	e	f	g	h
1.	$7\overline{18}$	$6\overline{26}$	$5\overline{27}$	$7\overline{25}$	$6\overline{21}$	$8\overline{27}$	$5\overline{29}$	$6\overline{22}$
2.	$6\overline{13}$	$8\overline{20}$	$8\overline{35}$	$9\overline{21}$	$4\overline{19}$	$5\overline{18}$	$8\overline{55}$	$7\overline{58}$
3.	$7\overline{30}$	$5\overline{24}$	$4\overline{21}$	$9\overline{48}$	$2\overline{17}$	$9\overline{86}$	$8\overline{63}$	$7\overline{24}$
4.	$4\overline{35}$	$2\overline{15}$	$5\overline{49}$	$8\overline{65}$	$9\overline{57}$	$6\overline{19}$	$7\overline{66}$	$5\overline{34}$
5.	$6\overline{18}$	$5\overline{12}$	$9\overline{29}$	$8\overline{41}$	$7\overline{36}$	$4\overline{22}$	$8\overline{37}$	$7\overline{20}$
6.	$8\overline{28}$	$3\overline{22}$	$6\overline{56}$	$7\overline{31}$	$6\overline{37}$	$3\overline{25}$	$9\overline{85}$	$8\overline{53}$
7.	$9\overline{40}$	$8\overline{45}$	$9\overline{77}$	$5\overline{48}$	$6\overline{20}$	$5\overline{43}$	$7\overline{46}$	$9\overline{61}$
8.	$7\overline{66}$	$5\overline{34}$	$9\overline{80}$	$9\overline{34}$	$6\overline{58}$	$7\overline{69}$	$9\overline{55}$	$6\overline{39}$

ASSIGNMENT 42

Divide:					
1.	$3\overline{87}$	2.	$4\overline{92}$	3.	$7\overline{98}$
4.	$2\overline{156}$	5.	$3\overline{297}$		
6.	$4\overline{184}$	7.	$5\overline{195}$	8.	$7\overline{441}$
9.	$9\overline{297}$	10.	$4\overline{156}$		
11.	$9\overline{643}$	12.	$8\overline{464}$	13.	$6\overline{152}$
14.	$7\overline{673}$	15.	$5\overline{395}$		
16.	$3\overline{146}$	17.	$7\overline{2469}$	18.	$7\overline{235}$
19.	$8\overline{498}$	20.	$6\overline{4734}$		
21.	$4\overline{265}$	22.	$3\overline{2365}$	23.	$3\overline{1783}$
24.	$5\overline{2933}$	25.	$4\overline{2331}$		
26.	$5\overline{177}$	27.	$6\overline{386}$	28.	$8\overline{496}$
29.	$5\overline{335}$	30.	$7\overline{5984}$		
31.	$6\overline{497}$	32.	$7\overline{329}$	33.	$4\overline{104}$
34.	$8\overline{215}$	35.	$8\overline{1914}$		
36.	$7\overline{163}$	37.	$9\overline{701}$	38.	$5\overline{156}$
39.	$3\overline{214}$	40.	$3\overline{128}$		
41.	$4\overline{326}$	42.	$6\overline{309}$	43.	$3\overline{1455}$
44.	$5\overline{1825}$	45.	$6\overline{2175}$		
46.	$9\overline{4037}$	47.	$7\overline{3284}$	48.	$7\overline{269}$
49.	$3\overline{2392}$	50.	$7\overline{5103}$		

E. Zeros in Quotients

(SUGGESTIONS FOR TEACHING ASSIGNMENT 43)

Zeros in quotients constitute one of the most troublesome items in division.

Zeros in two- and three-place quotients appear in different positions in the quotient.

Examples of this are:

$$\begin{array}{r} 10 \\ 6 \overline{) 60} \end{array}$$

Final in quotient

$$\begin{array}{r} 205 \\ 3 \overline{) 615} \end{array}$$

Not final in quotient

$$\begin{array}{r} 70 \text{ r} 2 \\ 5 \overline{) 352} \end{array}$$

Final in quotient with a remainder

The third type of the above examples is the most difficult. In the incorrect answer most frequently given the zero is omitted.

Working out a number of examples the long way is probably the best way to explain to the students how the zeros appear in the quotients. Examples like the following can be used:

$$\begin{array}{r} 30 \text{ r} 5 \\ 6 \overline{) 185} \\ \underline{18} \\ 5 \\ \underline{0} \\ 5 \end{array}$$

$$\begin{array}{r} 108 \\ 2 \overline{) 216} \\ \underline{2} \\ 1 \\ \underline{0} \\ 16 \\ \underline{16} \end{array}$$

Again it is up to the teacher as to when it is best to start using the short form (that is leaving out the zeros).

F. Word Problems

(SUGGESTIONS FOR TEACHING ASSIGNMENT 44)

Word problems involving division can be recognized by the following methods:

1. To find the number of small groups, all the same size, contained in a large group
2. To find how many are in each small group when you make a certain number of equal small groups from a larger group
3. To find the cost of one item when you know the cost of more than one (the cost of each being the same)
4. To find the quotient
5. To find how many times one number is contained in another

Some of the key words are: share equally, divided among, average, per. To gain proficiency in solving word problems involving division takes practice. Assignment 44 is intended to give this practice. It is suggested that the class go over some of the problems as a group so that the class understands why division is involved in the problems.

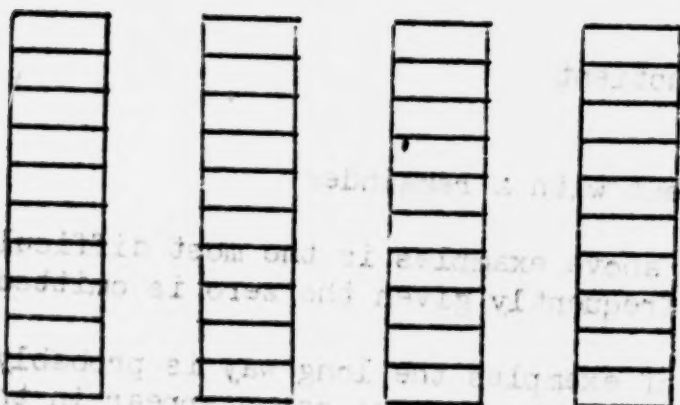
G. Division by 10 and Multiples of 10

(SUGGESTIONS FOR TEACHING ASSIGNMENT 45)

Probably the best way to introduce division by two-place divisors is to divide by 10 and multiples of 10.

Start with problems such as the following: John has 40 pennies to put in piles of 10. How many piles will he have?

Illustrate the problem with a drawing.



Show the division form.

$$\begin{array}{r} 4 \\ 10 \overline{)40} \\ \underline{40} \end{array}$$

This can be written 1 ten $\overline{)4}$ tens. You can say there are as many tens in 40 as there are 1's in 4. In other words you can divide the same way as you would with a one-figure divisor.

Explain carefully the reason why the 4 is written in the ones' place (because if it were written in the tens' place it would mean 4 tens or 40). Do several more examples such as the following:

$$10 \overline{)60}$$

$$10 \overline{)90}$$

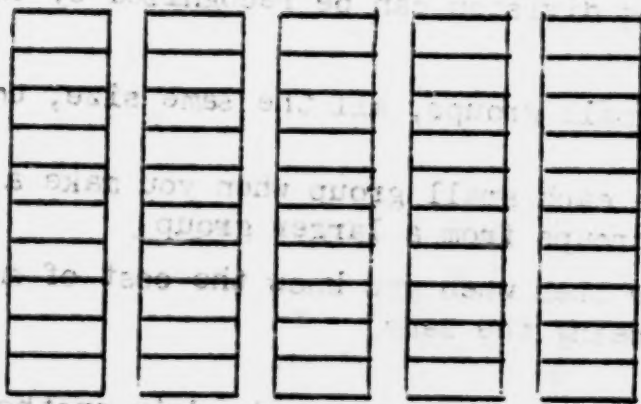
$$10 \overline{)30}$$

$$10 \overline{)80}$$

As you do each of these examples go over the idea that the answer can be found by dividing the tens' digits.

The next step is to introduce remainders when dividing by 10.

Example: Henry has 53 pennies to put in piles of 10. How many piles will he have?



$$\begin{array}{r} 5 \text{ r}3 \\ 10 \overline{)53} \\ \underline{50} \\ 3 \end{array}$$

Do several more examples.

$$10 \overline{)15}$$

$$10 \overline{)29}$$

$$10 \overline{)41}$$

$$10 \overline{)35}$$

The next step is to divide by multiples of 10. If the method of division by ten is well established then dividing by multiples of 10 is not difficult. Use as an example:

$$\begin{array}{r} 3 \\ 20 \overline{) 60} \\ \underline{60} \end{array}$$

Think of this problem as 2 tens $\overline{) 6}$ tens

There are as many 20's in 60 as there are 2's in 6. The answer 3 is written over the zero in the ones' place. It cannot be written over the 6 because it would be 30 instead of 3. Do several more examples such as the following:

$$30 \overline{) 90} \quad 40 \overline{) 80} \quad 30 \overline{) 120} \quad 20 \overline{) 180}$$

In some cases there are remainders. Use examples similar to the following:

$$\begin{array}{r} 2 \text{ r} 7 \\ 30 \overline{) 67} \\ \underline{60} \\ 7 \end{array} \quad \begin{array}{r} 4 \text{ r} 8 \\ 20 \overline{) 88} \\ \underline{80} \\ 8 \end{array} \quad \begin{array}{r} 7 \text{ r} 20 \\ 30 \overline{) 230} \\ \underline{210} \\ 20 \end{array} \quad \begin{array}{r} 6 \text{ r} 8 \\ 40 \overline{) 248} \\ \underline{240} \\ 8 \end{array}$$

H. Other Two-Place Divisors

(SUGGESTIONS FOR TEACHING ASSIGNMENT 46)

The next step in division is to divide by numbers which are not multiples of 10 but which restrict the quotient to one figure. Use the same method as was used with 10 and multiples of 10. Use an example similar to the following:

$$\begin{array}{r} 3 \\ 32 \overline{) 96} \\ \underline{96} \end{array}$$

There are as many 32's in 96 as there are 3's in 9. The quotient 3 is written in the ones' place. The next step is to multiply:

$$\begin{array}{r} \times 3 \\ 32 \\ \hline \end{array}$$

The 6 in this product means 6 ones, therefore it must be written in the ones' column below the dividend. The 9 in the product means 9 tens and must come in the tens' column below the dividend.

Do several more examples similar to the following and in each case emphasize the quotient figure is obtained by dividing the tens' digits.

$$21 \overline{) 63}$$

$$31 \overline{) 93}$$

$$37 \overline{) 74}$$

$$43 \overline{) 86}$$

The next step is to divide by multiples of 10. If the method of division by tens is well established then dividing by multiples of 10 is no problem.

In some problems it is necessary to use the first two figures of the dividend as in the following example:

$$\begin{array}{r} 7 \\ 31 \overline{) 217} \\ \underline{217} \end{array}$$

In this case the 217 can be broken down as follows:

217 = 2 hundreds 1 ten 7 ones
or 21 tens 7 ones (2 hundreds = 20 tens)

When we divide, we divide 21 tens by 3 tens and obtain the quotient 7.

Do several more examples similar to the following:

$$52 \overline{) 156}$$

$$35 \overline{) 175}$$

$$61 \overline{) 488}$$

In some problems there will be remainders.

$$\begin{array}{r} 8 \text{ r} 9 \\ 42 \overline{) 345} \\ \underline{336} \\ 9 \end{array}$$

$$\begin{array}{r} 7 \text{ r} 28 \\ 82 \overline{) 602} \\ \underline{574} \\ 28 \end{array}$$

$$\begin{array}{r} 5 \text{ r} 32 \\ 75 \overline{) 407} \\ \underline{375} \\ 32 \end{array}$$

In each problem be sure and explain the meaning of the remainder.

ASSIGNMENT 43

Divide:

1. $3/\overline{90}$ 2. $2/\overline{40}$ 3. $2/\overline{604}$ 4. $3/\overline{600}$ 5. $3/\overline{990}$ 6. $8/\overline{83}$
7. $5/\overline{51}$ 8. $6/\overline{63}$ 9. $4/\overline{82}$ 10. $3/\overline{91}$ 11. $7/\overline{356}$ 12. $8/\overline{243}$
13. $9/\overline{188}$ 14. $5/\overline{304}$ 15. $6/\overline{245}$ 16. $8/\overline{872}$ 17. $9/\overline{945}$ 18. $4/\overline{828}$
19. $5/\overline{540}$ 20. $2/\overline{616}$ 21. $3/\overline{610}$ 22. $6/\overline{640}$ 23. $5/\overline{548}$ 24. $4/\overline{822}$
25. $7/\overline{2945}$ 26. $9/\overline{7832}$ 27. $8/\overline{6563}$ 28. $7/\overline{1427}$
29. $9/\overline{3783}$ 30. $6/\overline{1562}$ 31. $6/\overline{3243}$ 32. $8/\overline{7235}$
33. $4/\overline{1642}$ 34. $7/\overline{2174}$ 35. $8/\overline{13445}$ 36. $9/\overline{2973}$

ASSIGNMENT 44

1. Forty-three boys turned out for baseball practice. The coach put 9 boys on a team. How many teams did he have? How many boys were left to use as substitutes?
2. Mary typed 480 words in 6 minutes. How many words did she type per minute?
3. There were 240 pupils in the ninth grade. They were divided into 8 groups for social studies. How many pupils were in each group?
4. Eight boys had 168 tickets to sell. If they divided the tickets equally among them, how many tickets did each boy take to sell?
5. Mr. Wallace drove 54 miles on 3 gallons of gas. How many miles did he go on one gallon?
6. The school library received 248 books. These books were placed equally on 8 shelves. How many books were on each shelf?
7. Mr. Watters drove 240 miles in 6 hours. He drove at the rate of how many miles per hour?
8. Henry worked in the produce section of a supermarket. He had 1062 pounds of potatoes to put into 9 sacks. How many pounds can be put in each sack?
9. If there are 5,280 feet in a mile, how many feet are there in one-half mile?
10. A bakery had a machine that cut 9 cookies at a time. If 4,995 cookies rolled from it in a day, how many times did the cutter stamp the dough?

11. At the bakery, another machine packaged 8 cookies in a cellophane bag. How many bags were needed for 3,184 cookies?
12. A capping machine seals 6 bottles of cold drinks at one time. How many times will it press to seal 7,488 bottles?
13. There are 48 boys going to a ball game. There are 8 cars to take them. If the same number of boys go in each car, how many boys will go in one car?
14. How many 4¢ stamps can you buy for 56¢?
15. How many 7¢ air-mail stamps can you buy for 50¢? Will there be any money left over?
16. An airplane flew 1,425 miles in 3 hours. What was the speed per hour?
17. A brick of ice cream will serve 6 people. How many bricks of ice cream are needed to serve 78 people?

ASSIGNMENT 45

Divide:

- | | | | | |
|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| 1. $10/\overline{40}$ | 2. $10/\overline{70}$ | 3. $10/\overline{90}$ | 4. $10/\overline{80}$ | 5. $10/\overline{60}$ |
| 6. $10/\overline{30}$ | 7. $10/\overline{20}$ | 8. $10/\overline{10}$ | 9. $10/\overline{50}$ | 10. $10/\overline{19}$ |
| 11. $10/\overline{68}$ | 12. $10/\overline{52}$ | 13. $10/\overline{18}$ | 14. $10/\overline{89}$ | 15. $10/\overline{57}$ |
| 16. $10/\overline{28}$ | 17. $10/\overline{65}$ | 18. $10/\overline{45}$ | 19. $10/\overline{94}$ | 20. $10/\overline{99}$ |
| 21. $30/\overline{60}$ | 22. $80/\overline{80}$ | 23. $30/\overline{90}$ | 24. $20/\overline{40}$ | 25. $40/\overline{80}$ |
| 26. $20/\overline{80}$ | 27. $30/\overline{30}$ | 28. $60/\overline{60}$ | 29. $20/\overline{160}$ | 30. $60/\overline{480}$ |
| 31. $30/\overline{270}$ | 32. $70/\overline{350}$ | 33. $90/\overline{370}$ | 34. $40/\overline{160}$ | 35. $80/\overline{320}$ |
| 36. $50/\overline{250}$ | 37. $70/\overline{420}$ | 38. $30/\overline{82}$ | 39. $20/\overline{150}$ | 40. $30/\overline{98}$ |
| 41. $40/\overline{95}$ | 42. $20/\overline{171}$ | 43. $30/\overline{143}$ | 44. $20/\overline{124}$ | 45. $40/\overline{253}$ |
| 46. $50/\overline{257}$ | 47. $40/\overline{136}$ | 48. $60/\overline{370}$ | 49. $80/\overline{496}$ | 50. $70/\overline{437}$ |

I. Two-and Three-Place Quotients

(SUGGESTIONS FOR TEACHING ASSIGNMENT 47)

The first step in problems with two-place quotients is to recognize the problems that have two-place numbers in their answers.

In a division example, if the dividend is as much as 10 times the divisor but not as much as 100 times the divisor, the quotient will be between 10 and 100. Then there will be two figures in the quotient. It would be well to put a large number of examples on the blackboard (similar to those below) and have the students indicate whether there will be one or two figures in the quotient.

$$6/\overline{24} \begin{cases} 1 \times 6 = 6 & \text{Since 24 is less than 60 the quotient is less than 10} \\ 10 \times 6 = 60 & \text{and therefore has only 1 figure in it.} \end{cases}$$

$$2/\overline{84} \begin{cases} 1 \times 2 = 2 & \text{Since 84 is between 20 and 200, the quotient is between} \\ 10 \times 2 = 20 & 10 \text{ and } 100. \text{ Therefore the quotient is a two-place number.} \\ 100 \times 2 = 200 \end{cases}$$

$$12/\overline{288} \begin{cases} 1 \times 12 = 12 & \text{Since 288 is between 120 and 1200 the quotient is} \\ 10 \times 12 = 120 & \text{between 10 and 100. The quotient is a two-place} \\ 100 \times 12 = 1200 & \text{number.} \end{cases}$$

When the quotient is a two-place number the first figure is written in the tens' place and the second figure is written in the ones' place.

When students can determine before dividing that the quotient is a two-place number then it assists them to understand the reason for dividing twice; once to find the tens' figure and again to find the ones' figure. At this point the students encounter the formal steps in division: divide, multiply and compare, subtract and compare, bring down. Many examples should be worked out very carefully (with explanation) for the students.

$$23/\overline{483} \quad 1. \text{ Determine the number of figures in the quotient.}$$

$$\begin{aligned} 1 \times 23 &= 23 & \text{Since 483 is between 230 and 2300 the quotient is between} \\ 10 \times 23 &= 230 & \\ 100 \times 23 &= 2300 & 10 \text{ and } 100. \text{ There are two figures in the quotient.} \end{aligned}$$

$$\begin{array}{r} 2 \\ 23 \overline{) 483} \end{array}$$

2. Divide 48 by 23. There are as many 23's in 48 as there are 2's in 4. The tens' figure in the quotient is 2.

$$\begin{array}{r} 2 \\ 23 \overline{) 483} \\ \underline{46} \end{array}$$

3. Multiply and compare. $2 \times 23 = 46$. 46 is less than 48.

$$\begin{array}{r} 2 \\ 23 \overline{) 483} \\ \underline{46} \\ 2 \end{array}$$

4. Subtract and compare. $48 - 46 = 2$. 2 is smaller than 23.

$$\begin{array}{r} 2 \\ 23 \overline{) 483} \\ \underline{46} \\ 23 \end{array}$$

5. Bring down the 3 ones from the dividend.

$$\begin{array}{r} 2 \\ 23 \overline{) 483} \\ \underline{46} \\ 23 \end{array}$$

6. Divide 23 by 23 to obtain the ones' figure in the quotient.

$$\begin{array}{r} 21 \\ 23 \overline{) 483} \\ \underline{46} \\ 23 \\ \underline{23} \end{array}$$

7. Multiply and compare. 23 is not larger than 23.

8. Subtract and compare. You need not write the zero.

Although this is a long process it should be worked out with several examples similar to the following before the students start the assignment.

$$23 \overline{) 506}$$

$$32 \overline{) 992}$$

$$42 \overline{) 882}$$

$$52 \overline{) 884}$$

In some problems there are four numbers in the dividend. The steps are similar to those in the above example.

$$51 \overline{) 1581}$$

1. Determine the number of figures in the quotient.

$$\begin{array}{l} 1 \times 51 = 51 \\ 10 \times 51 = 510 \\ 100 \times 51 = 5100 \end{array}$$

Since 1581 is between 510 and 5,100 the quotient is between 10 and 100.

There are two figures in the quotient.

$$\begin{array}{r} 3 \\ 51 \overline{)1581} \end{array}$$

2. Divide 158 by 51. There are as many 51's in 158 as there are 5's in 15. The tens' figure in the quotient is 3.

$$\begin{array}{r} 3 \\ 51 \overline{)1581} \end{array}$$

3. Multiply and compare. $3 \times 51 = 153$. 153 is less than 158.

$$\begin{array}{r} 3 \\ 51 \overline{)1581} \\ \underline{153} \\ 5 \end{array}$$

4. Subtract and compare. $158 - 153 = 5$. 5 is smaller than 51.

$$\begin{array}{r} 3 \\ 51 \overline{)1581} \\ \underline{153} \\ 51 \end{array}$$

5. Bring down the one from the dividend. This is done so the ones' figure in the quotient can be determined.

$$\begin{array}{r} 31 \\ 51 \overline{)1581} \\ \underline{153} \\ 51 \\ \underline{51} \end{array}$$

6. Divide 51 by 51 to obtain the ones' figure in the quotient.

7. Multiply and compare. $1 \times 51 = 51$.

8. Subtract and compare. $51 - 51 = 0$.

The next step is to extend the problems to three-place quotients. The process is the same except the number of places in the quotient increases the number of divisions.

$$31 \overline{)6541}$$

1. Determine the number of figures in the quotient.

$$1 \times 31 = 31$$

$$10 \times 31 = 310$$

$$100 \times 31 = 3100$$

$$1000 \times 31 = 31000$$

Since 6541 is between 3100 and 31,000 the quotient is between 100 and 1,000.

There are three figures in the quotient.

2. Since there are three figures in the quotient, the first figure is in hundreds' place. This figure is obtained by dividing 65 by 31. There are as many 31's in 65 as there are 3's in 6.

$$\begin{array}{r} 2 \\ 31 \overline{)6541} \\ \underline{62} \end{array}$$

3. Multiply and compare. $2 \times 31 = 62$. 62 is less than 65.

$$\begin{array}{r} 2 \\ 31 \overline{)6541} \\ \underline{62} \\ 3 \end{array}$$

4. Subtract and compare. $65 - 62 = 3$. 3 is less than 31.

$$\begin{array}{r} 31 \overline{) 6541} \\ 62 \\ \hline 34 \\ 21 \\ \hline 31 \overline{) 6541} \\ 62 \\ \hline 34 \\ 31 \\ \hline 211 \\ 31 \overline{) 6541} \\ 62 \\ \hline 34 \\ 31 \\ \hline 31 \\ \hline 211 \end{array}$$

5. Bring down the 5 tens from the dividend. From this

we obtain the tens' digit in our quotient

6. Divide 34 by 31.

7. Subtract $34 - 31 = 3$.

8. Bring down the one from the dividend. From this

we obtain the ones' digit in our quotient.

9. Divide 31 by 31.

10. Multiply. $31 \times 1 = 31$

11. Subtract. $31 - 31 = 0$

It would be advisable to do several examples similar to the following before doing the assignment.

$$14 \overline{) 2982}$$

$$42 \overline{) 9954}$$

$$33 \overline{) 5379}$$

Remainders occur with two-and three-place quotients just as they do with one-place quotients. Work problems similar to the following carefully with the students so that they understand and can interpret the meaning of the remainders.

$$\begin{array}{r} 11 \text{ r}5 \\ 35 \overline{) 390} \\ 35 \\ \hline 40 \\ 35 \\ \hline 5 \end{array}$$

$$\begin{array}{r} 23 \text{ r}16 \\ 54 \overline{) 1258} \\ 108 \\ \hline 178 \\ 162 \\ \hline 16 \end{array}$$

$$\begin{array}{r} 134 \text{ r}14 \\ 43 \overline{) 5776} \\ 43 \\ \hline 147 \\ 129 \\ \hline 186 \\ 172 \\ \hline 14 \end{array}$$

ASSIGNMENT 46

Divide:

1. $33/\overline{66}$ 2. $23/\overline{69}$ 3. $24/\overline{43}$ 4. $32/\overline{96}$ 5. $44/\overline{88}$
6. $21/\overline{42}$ 7. $42/\overline{84}$ 8. $31/\overline{93}$ 9. $34/\overline{68}$ 10. $21/\overline{63}$
11. $22/\overline{66}$ 12. $21/\overline{126}$ 13. $31/\overline{186}$ 14. $42/\overline{126}$ 15. $52/\overline{104}$
16. $61/\overline{366}$ 17. $81/\overline{486}$ 18. $91/\overline{455}$ 19. $72/\overline{216}$ 20. $62/\overline{124}$
21. $82/\overline{328}$ 22. $31/\overline{217}$ 23. $32/\overline{128}$ 24. $43/\overline{129}$ 25. $51/\overline{153}$
26. $32/\overline{128}$ 27. $54/\overline{108}$ 28. $21/\overline{189}$ 29. $92/\overline{368}$ 30. $83/\overline{249}$
31. $33/\overline{56}$ 32. $43/\overline{86}$ 33. $21/\overline{42}$ 34. $22/\overline{89}$ 35. $41/\overline{87}$
36. $32/\overline{99}$ 37. $42/\overline{96}$ 38. $42/\overline{189}$ 39. $32/\overline{173}$ 40. $43/\overline{139}$
41. $41/\overline{134}$ 42. $72/\overline{289}$ 43. $51/\overline{207}$ 44. $33/\overline{268}$ 45. $42/\overline{296}$
46. $31/\overline{169}$ 47. $67/\overline{472}$ 48. $84/\overline{767}$ 49. $53/\overline{480}$ 50. $74/\overline{622}$

ASSIGNMENT 47

1. In each problem tell whether the answer (the quotient) will have one, two, or three figures.

- | | | | |
|-------------------------|-------------------------|-------------------------|-------------------------|
| A. $62/\overline{434}$ | D. $31/\overline{837}$ | G. $13/\overline{455}$ | J. $16/\overline{1280}$ |
| B. $58/\overline{2552}$ | E. $34/\overline{7038}$ | H. $14/\overline{7294}$ | K. $15/\overline{9465}$ |
| C. $14/\overline{1386}$ | F. $16/\overline{80}$ | I. $17/\overline{1071}$ | L. $14/\overline{392}$ |

2. In each problem in Number 1 above place an x to show where the first figure in the quotient should be placed.

Divide:

- | | | | |
|---------------------------|---------------------------|---------------------------|--------------------------|
| 3. $33\overline{)396}$ | 4. $41\overline{)984}$ | 5. $32\overline{)416}$ | 6. $24\overline{)336}$ |
| 7. $31\overline{)744}$ | 8. $22\overline{)748}$ | 9. $34\overline{)408}$ | 10. $41\overline{)533}$ |
| 11. $42\overline{)504}$ | 12. $33\overline{)429}$ | 13. $64\overline{)832}$ | 14. $63\overline{)882}$ |
| 15. $22\overline{)902}$ | 16. $34\overline{)510}$ | 17. $52\overline{)728}$ | 18. $35\overline{)840}$ |
| 19. $63\overline{)1386}$ | 20. $92\overline{)1288}$ | 21. $54\overline{)1188}$ | 22. $72\overline{)1656}$ |
| 23. $52\overline{)1196}$ | 24. $42\overline{)1386}$ | 25. $82\overline{)1886}$ | 26. $61\overline{)1891}$ |
| 27. $73\overline{)1679}$ | 28. $91\overline{)1092}$ | 29. $81\overline{)1134}$ | 30. $52\overline{)1144}$ |
| 31. $51\overline{)26673}$ | 32. $43\overline{)13889}$ | 33. $14\overline{)1974}$ | 34. $32\overline{)5152}$ |
| 35. $51\overline{)21012}$ | 36. $43\overline{)14362}$ | 37. $44\overline{)988}$ | 38. $82\overline{)1890}$ |
| 39. $35\overline{)390}$ | 40. $31\overline{)350}$ | 41. $54\overline{)3948}$ | 42. $21\overline{)655}$ |
| 43. $72\overline{)1596}$ | 44. $44\overline{)678}$ | 45. $22\overline{)496}$ | 46. $42\overline{)478}$ |
| 47. $62\overline{)1388}$ | 48. $22\overline{)275}$ | 49. $32\overline{)680}$ | 50. $51\overline{)2660}$ |
| 51. $31\overline{)813}$ | 52. $82\overline{)1988}$ | 53. $24\overline{)278}$ | 54. $34\overline{)1394}$ |
| 55. $52\overline{)1164}$ | 56. $32\overline{)29196}$ | 57. $53\overline{)12925}$ | 58. $43\overline{)5776}$ |
| 59. $71\overline{)9270}$ | 60. $43\overline{)13889}$ | 61. $51\overline{)26673}$ | 62. $43\overline{)4986}$ |
| 63. $54\overline{)49538}$ | 64. $42\overline{)15878}$ | 65. $22\overline{)9174}$ | 66. $32\overline{)5346}$ |

J. Difficulties in Division (TEACHING SUGGESTIONS FOR ASSIGNMENT 48)

The preceding assignments were arranged so that more of the following difficulties in division would be encountered as the student progressed.

$$\begin{array}{r} 6 \\ 24 \overline{) 144} \end{array}$$
 The apparent quotient 7 is one too large.

$$\begin{array}{r} 6 \text{ r}16 \\ 24 \overline{) 160} \end{array}$$
 The apparent quotient 8 is two too large.

$$\begin{array}{r} 8 \text{ r}17 \\ 25 \overline{) 217} \end{array}$$
 The apparent quotient is more than 9.

$$\begin{array}{r} 27 \\ 48 \overline{) 1296} \end{array}$$
 Divisors ending in 6, 7, 8, or 9.

A great deal of time could be spent on methods of avoiding making mistakes in these problems, but students in Basic Mathematics for the most part are not able to absorb and retain all the different methods which would be involved. The best method would be to take examples similar to those above and work them out in class and show the problem involved.

The apparent quotient is one too large.

$$\begin{array}{r} 7 \\ 24 \overline{) 144} \end{array}$$
 1. Determine the number of figures in the quotient.

$1 \times 24 = 24$ Since 144 is between 24 and 240 the quotient is between 1 and 10. There is one figure in the quotient.

$$10 \times 24 = 240$$

2. Dividing 14 by 2, we obtain 7.

3. Multiply and compare. $24 \times 7 = 168$. Since 168 is more than 144, the quotient 7 is too large.

$$\begin{array}{r} 6 \\ 24 \overline{) 144} \\ \underline{144} \end{array}$$

4. Begin again using 6.

5. Multiply and compare. $6 \times 24 = 144$. The 144 is not too large.

The apparent quotient is two too large.

$$\begin{array}{r} 8 \\ 24 \overline{) 160} \\ \underline{192} \end{array}$$

1. Determine the number of figures in the quotient.

$$1 \times 24 = 24$$

Since 160 is between 24 and 240 the quotient is between 1 and 10. There is one figure in the quotient.

$$10 \times 24 = 240$$

2. Dividing 16 by 2, we obtain 8.

3. Multiply and compare. $24 \times 8 = 192$. Since 192 is more than 160 the quotient 8 is too large.

$$\begin{array}{r} 7 \\ 24 \overline{)160} \\ \underline{168} \end{array}$$

4. Begin again using the quotient 7.

5. Multiply and compare. $24 \times 7 = 168$. Since 168 is more than 160 the quotient 7 is too large.

$$\begin{array}{r} 6 \\ 24 \overline{)160} \\ \underline{144} \\ 16 \end{array}$$

6. Begin again using the quotient 6.

7. Multiply and compare. $24 \times 6 = 144$. The 144 is not too large.

The apparent quotient is more than 9.

$$\begin{array}{r} 9 \\ 25 \overline{)217} \end{array}$$

1. Determine the number of figures in the quotient.

$$1 \times 25 = 25.$$

Since 217 is between 25 and 250 the quotient is between 1 and 10. There is only one figure in

$$10 \times 25 = 250.$$

the quotient. Since the largest one-figure number is 9 you cannot put a 10 in the quotient. If the student understands this he will never attempt to put a 10 in the quotient.

2. Multiply and compare. $25 \times 9 = 225$. Since 225 is larger than 217, the quotient 9 is too large.

$$\begin{array}{r} 8 \\ 25 \overline{)217} \\ \underline{200} \\ 17 \end{array}$$

3. Begin again using the quotient 8.

4. Multiply and compare. $25 \times 8 = 200$. The 200 is not too large.

Divisors ending in 6, 7, 8, or 9.

$$\begin{array}{r} 3 \\ 48 \overline{)1718} \\ \underline{144} \\ 278 \end{array}$$

1. Since 48 is closer to 50 than 40 use the trial divisor 5 instead of 4.

2. There are 3 fives in 17.

$$\begin{array}{r} 5 \text{ } 5 \\ 36 \overline{)185} \\ \underline{180} \\ 5 \end{array}$$

3. This method avoids having a trial divisor which is too large. You have to be careful in using this method since there are problems where it results in a quotient which is too small.

4. By using a trial quotient of 4 the result is that there are more than 4 36's in 185.

The examples shown here and the problems in the assignment present most of the difficulties encountered in division. Rather than emphasize rules and special methods the student in Basic Mathematics will benefit more by working a large number of problems involving these difficulties.

K. Zeros in Two-and Three-Place Quotients

(TEACHING SUGGESTIONS FOR ASSIGNMENT 49)

In Section E of this unit problems with zeros in the quotients were discussed. The problems are extended here to cover two-and three-place quotients.

There are several possibilities:

Zero in the ones' place

$$\begin{array}{r} 20 \\ 12 \overline{)240} \end{array}$$

$$\begin{array}{r} 30 \text{ r}7 \\ 25 \overline{)757} \end{array}$$

$$\begin{array}{r} 120 \\ 34 \overline{)4080} \end{array}$$

$$\begin{array}{r} 690 \text{ r}23 \\ 73 \overline{)50393} \end{array}$$

Zero in the tens' place

$$\begin{array}{r} 304 \\ 23 \overline{)6992} \end{array}$$

$$\begin{array}{r} 507 \text{ r}47 \\ 52 \overline{)26411} \end{array}$$

One of the best ways to avoid errors involving zeros is to be sure that the first step of determining the number of figures in the quotient is done properly. If the student knows how many figures he must have in the quotient he is not likely to leave out any zeros.

Problems similar to the following should be explained carefully to the group before they start the assignment.

$$\begin{array}{r} 20 \\ 12 \overline{)240} \\ \underline{24} \\ 0 \end{array}$$

1. Determine the number of figures in the quotient.

1 $\times 12 = 12$ Since 240 is between 120 and 1,200 the quotient
10 $\times 12 = 120$ is between 10 and 100. The quotient has two
100 $\times 12 = 1200$ figures.

2. Divide. $24 \div 12 = 2$.

3. Multiply and compare. $12 \times 2 = 24$.

4. Subtract. $24 - 24 = 0$.

5. Bring down the ones' figure (the zero).

6. Divide. $0 \div 12 = 0$. The zero must be written in the quotient to indicate there are no ones. Here the zero is regarded as any other number. Emphasize to the students that the steps here are identical to the steps in any division problem.

$$\begin{array}{r} 120 \\ 34 \overline{) 4080} \\ \underline{34} \\ 68 \\ \underline{68} \\ 0 \end{array}$$

1. Determine the number of figures in the quotient.

$$\begin{array}{l} 1 \times 34 = 34 \\ 10 \times 34 = 340 \\ 100 \times 34 = 3,400 \\ 1000 \times 34 = 34,000 \end{array}$$

Since 4080 is between 3,400 and 34,000 the quotient is between 100 and 1,000. The quotient has three figures.

2. After you bring down the zero from the ones' place in the dividend you must divide.

$$0 \div 34 = 0.$$

This zero must be written in the quotient.

$$\begin{array}{r} 507 \text{ r}47 \\ 52 \overline{) 26,411} \\ \underline{260} \\ 41 \\ \underline{0} \\ 411 \\ \underline{364} \\ 47 \end{array}$$

1. Determine the number of figures in the quotient.

$$\begin{array}{l} 1 \times 52 = 52 \\ 10 \times 52 = 520 \\ 100 \times 52 = 5,200 \\ 1000 \times 52 = 52,000 \end{array}$$

Since 26,411 is between 5,200 and 52,000 the quotient is between 100 and 1,000. The quotient has three figures.

2. When you divide the second time, there are no 52s in 41.

3. Write the 0 in the quotient.

4. Multiply. $0 \times 52 = 0$.

5. Subtract. $41 - 0 = 41$.

6. Bring down the next number and continue.

If the zero steps are put in carefully and explained the difficulties with zero will decrease.

ASSIGNMENT 48

Divide:

1. $32 \overline{)187}$

2. $73 \overline{)362}$

3. $84 \overline{)327}$

4. $83 \overline{)570}$

5. $35 \overline{)165}$

6. $83 \overline{)485}$

7. $52 \overline{)258}$

8. $42 \overline{)120}$

9. $22 \overline{)170}$

10. $34 \overline{)95}$

11. $34 \overline{)182}$

12. $62 \overline{)546}$

13. $42 \overline{)242}$

14. $71 \overline{)352}$

15. $61 \overline{)483}$

16. $24 \overline{)69}$

17. $25 \overline{)166}$

18. $35 \overline{)243}$

19. $25 \overline{)1438}$

20. $24 \overline{)1623}$

21. $23 \overline{)160}$

22. $24 \overline{)1609}$

23. $35 \overline{)242}$

24. $35 \overline{)2725}$

25. $39 \overline{)273}$

26. $28 \overline{)168}$

27. $47 \overline{)3666}$

28. $36 \overline{)2412}$

29. $25 \overline{)209}$

30. $62 \overline{)609}$

31. $94 \overline{)9384}$

32. $52 \overline{)5095}$

33. $73 \overline{)708}$

34. $84 \overline{)801}$

35. $92 \overline{)909}$

36. $64 \overline{)617}$

37. $22 \overline{)2068}$

38. $54 \overline{)5130}$

39. $42 \overline{)4190}$

40. $71 \overline{)7010}$

41. $81 \overline{)8099}$

42. $63 \overline{)6124}$

43. $32 \overline{)3075}$

44. $27 \overline{)187}$

45. $56 \overline{)258}$

46. $78 \overline{)354}$

47. $39 \overline{)1286}$

48. $26 \overline{)236}$

49. $36 \overline{)1595}$

50. $26 \overline{)2296}$

ASSIGNMENT 49

Divide:

- | | | | |
|----------------------------|----------------------------|----------------------------|----------------------------|
| 1. $32 \overline{)640}$ | 2. $41 \overline{)2050}$ | 3. $79 \overline{)5530}$ | 4. $63 \overline{)5040}$ |
| 5. $72 \overline{)3600}$ | 6. $22 \overline{)1540}$ | 7. $42 \overline{)2520}$ | 8. $45 \overline{)1800}$ |
| 9. $34 \overline{)1700}$ | 10. $52 \overline{)1040}$ | 11. $64 \overline{)3240}$ | 12. $43 \overline{)1300}$ |
| 13. $25 \overline{)757}$ | 14. $41 \overline{)830}$ | 15. $24 \overline{)729}$ | 16. $72 \overline{)3610}$ |
| 17. $21 \overline{)4830}$ | 18. $42 \overline{)19320}$ | 19. $33 \overline{)10230}$ | 20. $56 \overline{)43120}$ |
| 21. $73 \overline{)50393}$ | 22. $74 \overline{)42982}$ | 23. $24 \overline{)16341}$ | 24. $83 \overline{)32393}$ |
| 25. $54 \overline{)40006}$ | 26. $72 \overline{)36741}$ | 27. $65 \overline{)18261}$ | 28. $43 \overline{)33996}$ |
| 29. $72 \overline{)35336}$ | 30. $33 \overline{)6699}$ | 31. $32 \overline{)29056}$ | 32. $24 \overline{)4824}$ |
| 33. $21 \overline{)6342}$ | 34. $24 \overline{)4920}$ | 35. $41 \overline{)8405}$ | 36. $23 \overline{)6992}$ |
| 37. $27 \overline{)8303}$ | 38. $21 \overline{)4327}$ | 39. $31 \overline{)9425}$ | 40. $52 \overline{)26411}$ |
| 41. $32 \overline{)12965}$ | 42. $65 \overline{)32948}$ | 43. $36 \overline{)32400}$ | 44. $95 \overline{)38000}$ |
| 45. $28 \overline{)16800}$ | 46. $34 \overline{)13621}$ | 47. $53 \overline{)37136}$ | 48. $78 \overline{)23432}$ |
| 49. $25 \overline{)7647}$ | 50. $53 \overline{)21618}$ | | |

L. Problems Involving Money

(TEACHING SUGGESTIONS FOR ASSIGNMENT 50)

Many problems in division involve dollars and cents. The method of division in such problems is exactly the same as in other division problems. The part that needs explanation at this time is the labeling and interpretation of the quotient.

The following examples will assist in explaining the quotient.

1. Divide \$2.75 by 25. You are dividing \$2.75 into 25 equal groups. Therefore the quotient indicates the amount of money in each group. The quotient is labeled with a dollar sign and decimal point.

$$\begin{array}{r} \$.11 \\ 25 \overline{) \$2.75} \\ \underline{25} \\ 25 \\ \underline{25} \\ 0 \end{array}$$
2. Divide \$2.75 by \$.25. You are finding how many \$.25 there are in \$2.75. Your answer is the number of groups (not an amount of money). There is no dollar sign or decimal point in the answer. It means there are 11 groups of \$.25 in \$2.75.

$$\begin{array}{r} 11 \\ $.25 \overline{) \$2.75} \\ \underline{25} \\ 25 \\ \underline{25} \\ 0 \end{array}$$

You can generalize that:

1. Money divided by a number gives us the amount of money in each group.

$$\frac{\text{Money}}{\text{Number}} = \frac{\text{Money}}{\text{Money}}$$
2. Money divided by money gives us the number of groups.

$$\frac{\text{Money}}{\text{Money}} = \frac{\text{Number}}{\text{Money}}$$

M. Word Problems

(TEACHING SUGGESTIONS FOR ASSIGNMENT 51)

In Section F and Assignment 44 the methods of recognizing word problems involving division were discussed. These should be reviewed before starting Assignment 51.

N. Two-Step Problems

(TEACHING SUGGESTIONS FOR ASSIGNMENT 52)

Now that all four fundamental operations have been covered it is possible to solve problems which involve combining two operations together.

Determining an average is an example of a two-step problem. The average is the sum of the numbers divided by the number of items. Do several examples like the following to show the meaning of average.

(TEACHING SUGGESTIONS FOR ASSIGNMENT 50)

1. Henry's scores in his spelling tests were as follows: 90, 96, 85, 100, and 94. Find his average score.

$$\begin{array}{r} 90 \\ 96 \\ 85 \\ 100 \\ 94 \\ \hline 465 \end{array}$$

93 is his average score.

$$\begin{array}{r} 93 \\ 5 \overline{)465} \\ \underline{45} \\ 15 \\ \underline{15} \\ 0 \end{array}$$

2. Mr. Johnson employs 27 men in his factory. His weekly payroll is \$1,971. What is the average wage of each man for one week?

$$\begin{array}{r} 73 \\ 27 \overline{)1971} \\ \underline{189} \\ 81 \\ \underline{81} \\ 0 \end{array}$$

There are problems in Assignment 52 which involve using more than one operation. These two-step problems involve a hidden question. To find the answer to the problem you must find the answer to the hidden question.

0. Review

(TEACHING SUGGESTIONS FOR ASSIGNMENTS 53 AND 54)

The problems in these two assignments are intended to serve as a review of all of the work in Basic Mathematics 1.

P. Activities

(TEACHING SUGGESTIONS FOR ASSIGNMENT 55)

The problems in this assignment are intended to serve as a review of all the work in Basic Mathematics 1 and are also to be used as an activity for the student.

ASSIGNMENT 50

Divide:

1. $4/\$3.48$

2. $9/\$9.90$

3. $3/\$3.06$

4. $8/\$1.68$

5. $9/\$3.65$

6. $5/\$12.75$

7. $24/\$13.20$

8. $73/\$16.79$

9. $64/\$22.56$

10. $56/\$17.91$

11. $\$.16/\$3.36$

12. $\$.33/\$6.93$

13. $\$.22/\$15.84$

14. $\$.64/\$26.88$

15. $33/\$43.89$

16. $42/\$35.26$

17. $73/\$503.95$

18. $22/\$57.60$

19. $65/\$350.00$

20. $22/\$91.74$

21. $63/\$91.35$

22. $33/\$13.66$

23. $\$.34/\$19.50$

24. $\$.64/\$24.75$

25. $\$.43/\$30.84$

26. $41/\$17.41$

27. $\$.22/\$226.19$

28. $63/\$189.46$

ASSIGNMENT 51

1. Mr. Conklin's yearly salary is \$8,508. How much does he earn per month?
2. Mrs. Stone's milk bill for a month was \$10.81 for 47 quarts of milk. What was the price per quart?
3. A 25-pound sack of potatoes cost \$1.75. What was the cost per pound?
4. Mr. Collins bought a dozen golf balls for \$8.40. What was the cost of each ball?
5. A king salmon weighs about 23 pounds. A salmon boat brought in a load of king salmon weighing 4,715 pounds. Assuming that the weight of each fish is 23 pounds, how many fish were in the load?
6. A swimming pool is 60 feet long. How many times will Jim have to swim the pool in order to swim 180 feet?
7. Kevin paid \$.96 to have 8 snapshots printed. How much did it cost for each snapshot?
8. Michael has \$58.50 left to pay on his bicycle. He is going to pay \$4.50 each month. How many months will it take him to finish paying for the bicycle?
9. The total cost of improving a home was \$780. If the cost was paid in equal payments for 12 months, what was the amount paid each month?
10. Jim earns \$49.00 each week. He works 40 hours a week. How much does he earn in one hour?
11. The total cost of 28 science books was \$30.24. How much did each book cost?
12. The ninth-grade science class purchased a globe for \$8.51. If the 37 students shared the cost equally, how much did each student pay?
13. Mr. Sloan sold his farm of 195 acres for \$30,420. How much was this for each acre of land?
14. George's father said his car travels 18 miles on a gallon of gasoline. How many gallons of gasoline will he need to travel 432 miles?
15. Mr. Robinson buys a 52-ride ticket for \$18.20. How much is this for each ride?
16. It is about 2,184 miles from Los Angeles to Chicago. It takes a fast train about 39 hours to make the trip. How many miles does the train travel per hour?
17. There were 207 tickets sold for a church dinner. The committee planned to put 23 people at each table. How many tables will be needed?
18. Jack's father pays \$35 a month on his car. In how many months can he pay a balance of \$280 which he still owes?
19. Six footballs cost \$54.60. How much does one football cost?
20. A rancher bought 20 colts for \$1789.00. How much did he pay for each colt?
21. Two hundred eighty-three boys were to be lined up on the playground. If 21 boys stood in each row, how many rows were there? How many boys could not get in line?

22. A basketball team made 693 points in 21 games. How many points did the team average per game?
23. The cost of a telephone in a certain city is \$4.80 a month. If we count 30 days as a month, what is the cost for one day for the telephone?
24. A school had 638 pupils and 22 teachers. How many pupils were there for each teacher?
25. Charlie's father paid \$720 on his new car in one year. How much did he pay in a month?
26. A dealer bought 16 television sets for \$2,480. How much did he pay for each set?
27. A New England factory made 21,060 watches in 30 working days. How many watches were made in one day?
28. Mr. Smith distributed telephone directories. He had 17 days in which to deliver 3,655 directories. How many did he distribute each day?
29. Mr. Henry spent \$118.69 for 11 awnings for his home. What was the price of each awning?
30. On a trip, Mr. Young paid \$39.00 for 6 days at a hotel. How much did he pay for one day?
31. In a large city parking lot there were 1637 cars. They were parked in 38 rows. How many cars were in each row? How many cars were left over?
32. The average freight car hauls 48 tons. How many cars will be needed to haul 2,400 tons?
33. A class treasurer has \$8.25. He obtained the money by collecting \$.25 from each class member. How many students are in the class?
34. How long will it take an automobile traveling at 42 miles per hour to travel 4,326 miles?
35. Thirty-two cantaloupes can be packed in one crate. How many crates will be needed to pack 672 cantaloupes?
36. Mr. Simpson has earned \$140 and has worked a total of 80 hours. What is his hourly wage?
37. Jerry bought 5 rolls of film to take on a hike. He paid \$3.25 for the five rolls of film. What was the cost of one roll?
38. Mr. Zitter paid \$4.90 for 14 gallons of gasoline. How much is that per gallon?
39. Mr. Robinson's secretary can type 65 envelopes in one hour. How long will it take her to type 455 envelopes?

ASSIGNMENT 52

1. A high school basketball team scored 53, 47, and 44 points in three games. Find the average score.
2. Find the average of each of the following sets of numbers:
 - a. 245, 225, 190
 - b. 7, 6, 5, 4, 3, 2, 1
 - c. 5, 14, 14, 3, 19
3. Mr. Moseley traveled on a plane that flew 924 miles in 3 hours. What average distance did it travel in one hour?
4. A computing machine can work 545 problems in 5 minutes. What is the average number of problems the machine can work in one minute?
5. On Monday there were 32 students present in Mr. Helm's mathematics class, on Tuesday there were 31, on Wednesday there were 32, and on Thursday there were 29. What was the average attendance for those 4 days?
6. Jim weighs 106 pounds, Harry weighs 113 pounds and Charlie weighs 108 pounds. What is their average weight?
7. Four trucks carried the following weights: 8,340 pounds, 9,160 pounds, 11,220 pounds and 10,320 pounds. What is the average load of these trucks?
8. Mary has 92, 96, 80, 83, and 74 for grades in mathematics. What is her average grade?
9. Mr. Turner drove his car 444 miles in 12 hours. How many miles an hour did he average?
10. Jack Russell had \$14.50. He paid \$2.25 for a baseball bat, \$3.75 for a glove, \$1.85 for a ball, and \$5.95 for baseball shoes. How much money did he have left?
11. At a high school football game, tickets for adults are \$1.00. Tickets for children are half price. How much will 6 children's tickets cost?
12. A railroad boxcar can carry 92,400 pounds. A boxcar has been loaded with 1,438 bushels of wheat which weigh 56 pounds a bushel. How many more pounds could be loaded on the boxcar?
13. John bought notebook paper for \$.25, a bottle of ink for \$.15, and pencils for \$.36. How much change should he receive for \$5.00?
14. Mr. Adams bought 7 gallons of gasoline at \$.35 a gallon. How much change should he receive from \$5.00?
15. The distance from New York to San Diego is 3,240 miles by train. The train travels 60 miles per hour. A plane makes the trip in 12 hours. How much longer does the train take?
16. The Smith family drove 720 miles on a trip. It took them 16 hours to drive that distance. How many miles per hour did they average?

ASSIGNMENT 53

6508

Solve the following review problems:

1.
$$\begin{array}{r} 964 \\ 403 \\ +833 \\ \hline \end{array}$$
2.
$$\begin{array}{r} 6236 \\ -2967 \\ \hline \end{array}$$
3.
$$\begin{array}{r} 96 \\ \times 46 \\ \hline \end{array}$$
4.
$$60 \overline{)3893}$$
5.
$$\begin{array}{r} 3347 \\ 934 \\ 4765 \\ 600 \\ + 653 \\ \hline \end{array}$$
6.
$$\begin{array}{r} 27,000 \\ 594 \\ 678 \\ +1,436 \\ \hline \end{array}$$
7.
$$\begin{array}{r} 9600 \\ -7463 \\ \hline \end{array}$$
8.
$$\begin{array}{r} 1624 \\ \times 90 \\ \hline \end{array}$$
9.
$$19 \overline{)15035}$$
10.
$$18 \overline{)15825}$$
11.
$$19 \overline{)3921}$$
12.
$$9080 \overline{)3719}$$
13.
$$\begin{array}{r} \$96.40 \\ \times 405 \\ \hline \end{array}$$
14.
$$\begin{array}{r} \$463.96 \\ -404.09 \\ \hline \end{array}$$
15.
$$\begin{array}{r} \$20.00 \\ -8.54 \\ \hline \end{array}$$
16.
$$\begin{array}{r} 5001 \\ -2373 \\ \hline \end{array}$$
17.
$$\begin{array}{r} \$5.45 \\ 83.03 \\ .36 \\ 6.70 \\ 78.05 \\ + .59 \\ \hline \end{array}$$
18.
$$45 \overline{)31510}$$
19.
$$\begin{array}{r} 132,000 \\ -26,435 \\ \hline \end{array}$$
20.
$$\begin{array}{r} 263,416 \\ -183,217 \\ \hline \end{array}$$
21.
$$\begin{array}{r} \$76.29 \\ \times 58 \\ \hline \end{array}$$
22.
$$\begin{array}{r} \$59.32 \\ \times 60 \\ \hline \end{array}$$
23.
$$\begin{array}{r} \$7.62 \\ \times 309 \\ \hline \end{array}$$
24.
$$\begin{array}{r} \$9.26 \\ \times 500 \\ \hline \end{array}$$
25.
$$\begin{array}{r} 48,621 \\ 94,513 \\ 86,917 \\ +20,806 \\ \hline \end{array}$$
26.
$$\begin{array}{r} 520,421 \\ -219,666 \\ \hline \end{array}$$
27.
$$\begin{array}{r} \$24.07 \\ 3.15 \\ 4.72 \\ +15.10 \\ \hline \end{array}$$
28.
$$\begin{array}{r} 291 \\ \times 536 \\ \hline \end{array}$$
29.
$$\begin{array}{r} 800 \\ \times 639 \\ \hline \end{array}$$
30.
$$65 \overline{)40040}$$
31.
$$78 \overline{)29,172}$$
32.
$$57 \overline{)26,047}$$
33.
$$98 \overline{)8,916}$$
34.
$$\begin{array}{r} \$90.00 \\ -56.32 \\ \hline \end{array}$$
35.
$$\begin{array}{r} 7,452 \\ 620 \\ 803 \\ 1,709 \\ +2,654 \\ \hline \end{array}$$
36.
$$\begin{array}{r} \$5,600.00 \\ -4,721.10 \\ \hline \end{array}$$
37.
$$\begin{array}{r} \$400.00 \\ -138.75 \\ \hline \end{array}$$
38.
$$\begin{array}{r} 8052 \\ \times 46 \\ \hline \end{array}$$
39.
$$34 \overline{)7038}$$
40.
$$31 \overline{)8382}$$
41.
$$25 \overline{)\$18.75}$$
42.
$$14 \overline{)1386}$$
43.
$$\begin{array}{r} 975 \\ \times 208 \\ \hline \end{array}$$
44.
$$\begin{array}{r} \$24.67 \\ \times 23 \\ \hline \end{array}$$
45.
$$\begin{array}{r} \$981.02 \\ -99.99 \\ \hline \end{array}$$
46.
$$\begin{array}{r} 686,703 \\ -206,491 \\ \hline \end{array}$$
47.
$$\begin{array}{r} 3605 \\ \times 60 \\ \hline \end{array}$$

48. Fill in the Roman numeral for each of the following numbers:

- A. 9 _____ C. 6 _____ E. 10 _____
 B. 12 _____ D. 1 _____ F. 3 _____

49. Fill in the Arabic numbers for each of the following Roman numerals:

- A. XII _____ C. XX _____ E. IX _____
 B. VII _____ D. M _____ F. IV _____

50. Write each of these numbers in figures:

- A. Four million, six thousand, sixty.
 B. Nine billion, eight thousand.
 C. Two hundred million.

ASSIGNMENT 54

- David paid 35¢ for a magazine. He gave the clerk a \$5.00 bill. How much change did he receive?
- There were 15 rows of cars in a parking lot, with 40 cars in a row. How many cars were in the lot?
- Mrs. Smith bought 20 yards of cloth at \$2.95 a yard. How much did she pay for the cloth?
- If you traveled through the center of the moon the distance would be 2,163 miles. If you traveled through the center of the earth you would travel 7,918 miles. How much farther is it through the center of the earth than through the center of the moon?

5. The pull of gravity on the earth is 6 times the pull of gravity on the moon. This means that a person on the earth weighs 6 times as much as he would on the moon.
- If a person weighs 40 pounds on the moon how much would he weigh on earth?
 - If a person weighs 120 pounds on earth how much would he weigh on the moon?
 - How much do you weigh?
 - How much would you weigh on the moon?
6. A lighthouse beacon flashes every 5 seconds. How many times does it flash in an hour?
7. Henry's father bought a table tennis set for \$5.98. He also bought two extra paddles at \$.79 each and a dozen balls at \$.95 a dozen. How much did he pay altogether?
8. The distance in miles between the sun and the planets is as follows:
- | | | | |
|---------|------------|-------|-------------|
| Earth | 92,900,000 | Venus | 67,200,000 |
| Mercury | 36,000,000 | Mars | 141,500,000 |
- Which planet is closest to the sun?
 - Which of these planets is farthest from the sun?
 - Which is the warmest planet?
 - Which of these planets is the coldest?
9. The owner of a toy store bought 12 drums for \$10.50. He sold them for \$1.25 each. How much did he make on all 12 drums?
10. Mr. Sloan earns \$16.75 a day. How much can he earn in a month that has 23 working days?
11. A grocer bought 8 boxes of grapefruit with 12 grapefruit in a box. If he sold them for 12¢ each how much did he receive for the grapefruit?
12. Jack saves \$1.25 each month for a year. How much will he have saved at the end of a year?
13. How long would it take a bus to travel 1,050 miles if its speed averaged 50 miles an hour?
14. If an airplane can travel from Chicago, Illinois to Valparaiso, Chile a distance of 5,267 miles, in 23 hours, what would be the average rate of speed?
15. How many containers of milk are there in 25 cases if each case holds 24 containers?

5. The pull of gravity on the earth is 6 times the pull of gravity on the moon. This means that a person on the earth weighs 6 times as much as he would on the moon.

ASSIGNMENT 55

- a. If a person weighs 60 pounds on the moon how much would he weigh on earth?
- b. If a person weighs 120 pounds on earth how much would he weigh on the moon?

1. Find the missing numbers in the magic square below.

	10	5
8	6	4
7		9

2. A telephone person has over 3 seconds. How many times does it flash in an hour?

3. Henry's father bought a barrel of apples for \$5.98. He also bought two more barrels at the same price. How much did he pay altogether?

4. The distance in miles between the planets is as follows:

Venus 67,300,000
Mars 141,300,000

Earth 99,900,000
Mars 36,000,000

2. Make a magic square by multiplying each of the numbers in Problem 1 by 4.

- a. Which planet is closest to the sun?
- b. Which is the nearest planet?
- c. Which of these planets is the coldest?

9. The owner of a toy store bought 12 drums for \$10.50. He sold them for \$1.25 each. How much did he make on 12 drums?

10. Mr. Sloan earns \$16.75 a day. How much can he earn in a month that has 23 working days?

11. A grocer bought 8 boxes of grapefruit with 12 grapefruit in a box. If he sold them for 12¢ each, how much did he receive for the grapefruit?

12. Jack saves \$1.25 each week. How much will he have saved at the end of a year?

13. How long would it take a bus to travel 1,050 miles if its speed averaged 50 miles an hour?

14. If an airplane can travel from Chicago, Illinois to Valparaiso, Chile a distance of 5,207 miles, in 23 hours, what would be the average rate of speed?

15. How many containers of milk are there in 23 cases if each case holds 24 containers?

3. Fill in the puzzle.

a	b	c		d	e	f
g				h		
		i		j		
k	l			m		
n						
p		q		r	s	t
u				v		

ACROSS

- a) $337 + 93 + 36 + 81 + 32$
 d) $144 + 432 + 220 + 146$
 g) 14×33
 h) $42/\overline{6006}$
 i) $816 - 726$
 j) $82/\overline{1394}$
 k) 42×23
 m) $732 - 454$
 n) $3000 - 2943$
 o) $63/\overline{1134}$
 p) 13×63
 r) $39456 - 38507$
 u) $37/\overline{7622}$
 v) 6×38

DOWN

- a) $29/\overline{1566}$
 b) $45/\overline{3420}$
 c) 8×1162
 d) $2000 - 1909$
 e) $9/\overline{39753}$
 f) $416 + 325 + 843 + 794$
 k) 6×1597
 l) 55×122
 m) $728 + 419 + 927 + 818$
 q) $752 - 656$
 s) $7 + 6 + 6 + 15 + 8$
 t) $58/\overline{5684}$

Bibliography

Brueckner, L. J. and Grossnickle, F.E. Making Arithmetic Meaningful. Philadelphia: John C. Winston Company, 1953.

Buswell, G.T., Brownell, W.A. and Sauble, Irene. Teaching Arithmetic We Need. Boston: Ginn and Company, 1955.

Clark, J. R. and Eads, Laura K. Guiding Arithmetic Learning. Yonkers-on-Hudson, New York: World Book Company, 1954.

Morton, R. L. et al. Making Sure of Arithmetic. Morristown, New Jersey: Silver Burdett Company, 1955.

Wrightstone, J.W. and Fishbein, Lillian K. Learning to Use Arithmetic (Teachers' Edition). Grade 6. Boston: D.C. Heath and Company, 1958.

ANSWERS FOR BASIC MATHEMATICS I

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ANSWERS FOR BASIC MATHEMATICS I

ASSIGNMENT 1

- 1) (a) 93 (b) 57 (c) 235 (d) 579 2) ~~645~~, ~~515~~, ~~635~~
3) ~~231~~, ~~933~~, ~~635~~, ~~937~~ 4) 759, 729
5) By its place in the number
6) 4 is in tens' place and means 4 tens, or 40, 9 is in ones' place and means 9 ones.
7) (a) 3 (b) 6, 7 (c) 9, 4, 3 8) (a) 9 (b) 99 (c) 999
9) (a) 0 (b) 10 (c) 100 . 10) (a) 38 (b) 72 (c) 89
EXTRA CREDIT (a) 2, 9, 3 or 293 (b) 5, 4, 8 or 548 (c) 7, 0, 6 or 706

ASSIGNMENT 2

- 1) (a) No tens (b) no ones (c) no ones (d) no hundreds
2) (a) hundreds', tens', ones' (b) 0, 8, 9
3) (a) 806 (b) 950
6) (a) no tens (b) Keeps it in correct position
7) (b) 79 (c) 6 (d) 2 (e) 4 (f) 33 (g) 8 (h) 7

ASSIGNMENT 3

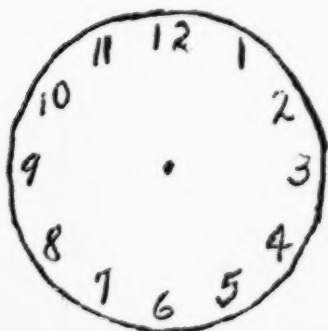
- 1) (a) 3,675 (b) 54,768 (c) 7,866 (d) 6,580 (e) 19,001 (f) 6,050
(g) 89,099 (h) 14,030 (i) 40,900 (j) 3,100 (k) 28,008 (l) 69,000
2) (a) 89,099 (b) 40,900 (c) 89,099 (d) 89,099
3) (a) 3,635 (b) 52,982 (c) 64,700 (d) 8,008 (e) 15,050 (f) 40,000
4) (a) 61,207 (b) \$8,924 (c) 714 (d) 7,292
5) To separate the hundreds from the thousands
6) (a) 9,999; 1,000 (b) 99,999; 10,000
7) (a) 486 (b) 9,843 (c) 7,952 (d) 3,400 (e) 702 (f) 5,006
10) 7654 11) (a) 1389 (b) 1389 (c) 5912
12) 8753 13) 6, 258, 285, 528, 582, 825, 852

ASSIGNMENT 4

- 1) (a) 300 (b) 400 (c) 300 (d) 400 (e) 300 (f) 400 (g) 400
(h) 400 (i) 300 (j) 300 (k) 400 (l) 300
- 2) (a) 800 (b) 900 (c) 800 (d) 900 (e) 800 (f) 900 (g) 800
(h) 800 (i) 900 (j) 900 (k) 900 (l) 900
- 3) (a) 900 (b) 2,300 (c) 7,700 (d) 5,900 (e) 3,700 (f) 12,300
(g) 400 (h) 700 (i) 35,700
- 4) (a) 700 mi. (b) 900 radios (c) 400 books (d) 300 students
(e) 7,900 TV sets
- 5) San Francisco, 2200; Baltimore, 700; Cincinnati, 300; Detroit, 300;
Norfolk, 900; Pittsburgh, 500; Dallas, 1000; Denver, 1000;
Los Angeles 2200
- 6) Cadillac, 121,800; Edsel, 45,700; DeSoto, 98,800; Rambler, 76,300
- 7) Chicago Teachers College, 3,600; DePaul, 6,700; Loyola, 7,500;
Roosevelt, 4,000; University of Chicago, 7,200
- 8) Board of Trade, 600 ft.; Prudential, 600 ft.; Pittsfield, 600 ft.;
Kemper, 600 ft.; Field, 500 ft.; One LaSalle, 500 ft.
- 9) 1955, 45,300; 1956, 28,800; 1957, 30,700

ASSIGNMENT 5

- 1) (a) IX (b) IV (c) VI (d) II (e) III (f) VIII (g) VII (h) V
(i) I (j) XII (k) XI (l) X
- 2) (a) 9 (b) 12 (c) 4 (d) 10 (e) 5 (f) 6 (g) 11 (h) 7 (i) I
(j) 2 (k) 3 (l) 8
- 3) (a) II (b) IV (c) IX (d) VIII
- 4) (a) I (b) V (c) X (d) III (e) IV (f) VIII
- 6)



- 7) I, II, III, IV, V, VI, VII, VIII, IX, X
 8) (a) V (b) III (c) IX (d) II
 9) (a) III (b) I (c) II (d) None (e) IV (f) I
 11) (a) L (b) XXV (c) X (d) M (e) V (f) XX (g) VII (h) C
 12) (a) 10 (b) 25 (c) 100 (d) 1000 (e) 20 (f) 50 (g) 9 (h) 5
 13) (a) X (b) M (c) C (d) XXV

ASSIGNMENT 6

- 1) (b) 9 tens + 8 ones or $90 + 8 = 98$
 (c) 7 hundreds + 6 tens + 9 ones or $700 + 60 + 9 = 769$
 (d) 1 thousand + 3 hundreds + 6 tens + 9 ones or $1000 + 300 + 60 + 9 = 1369$
 2) (a) 67 (b) 85 (c) 74 (d) 99 (e) 69 (f) 967 (g) 879 (h) 1089
 (i) 779 (j) 879
 3) 56, 63, 79, 47, 96, 107
 4) (c) 996 (d) 969 (e) 23 (f) 99 (g) 898 (h) 579
 5) 8, 83; 90, 5; 9, 28, 6, 42
 6) (a) 678 (b) 249 (c) 489 (d) 69
 7) V

		3	7		
		9	6		
1	8			5	2
4	8			3	9
		6	1		
		9	9		

ASSIGNMENT 7

- 1) 89 2) 39 3) 97 4) 78

ASSIGNMENT 8

- 1) (a) Ninety-three cents (b) Twenty-six dollars and eighty-two cents
(c) Six hundred three dollars and nineteen cents (d) Seventy dollars
and seven cents (e) Twenty-nine dollars and forty-two cents (f) Nine
hundred seven dollars and nine cents
- 2) (a) \$9.17 (b) \$40.40 (c) \$50.00 (d) \$300.00 (e) \$.23 (f) \$16.05
- 3) (a) \$8.80 (b) \$3.42 (c) \$.91 (d) \$2.41 (e) \$7.08
- 4) (b) 3 pennies, 1 nickel, 1 quarter, and 2 dollars
(c) 2 pennies, 1 quarter, and 1 half-dollar
(d) 2 dimes, 1 quarter, and one dollar
(e) 1 penny, 1 dime, 1 quarter and 1 half-dollar
(f) 4 pennies and 1 quarter
- 5) (a) \$.69 (b) \$4.97 (c) \$68.69 (d) \$894.87 (e) \$749.83 (f) \$377.87
- 6) (a) \$.28 (b) \$.33 (c) \$.56 (d) \$.17 (e) \$.36
- 7) (a) \$4.95 (b) \$7.80
- 8) (a) \$.79 (b) \$.89 (c) \$.76
- 9) Gr, groceries; Pr, produce; A,B,C, cash registers; Mt, meat; TL, total
amount of purchase
- 10) \$6.79

ASSIGNMENT 9

- 2) 8 tens + 12 ones or 9 tens + 2 ones or $90 + 2 = 92$
- 3) 7 tens + 15 ones or 8 tens + 5 ones or $80 + 5 = 85$
- 5) 5 hundreds + 13 tens + 7 ones or 6 hundreds + 3 tens + 7 ones or $600 + 30 + 7 = 637$
- 6) 8 hundreds + 11 tens + 7 ones or 9 hundreds + 1 ten + 7 ones or $900 + 10 + 7 = 917$

ASSIGNMENT 10

- 1) 82 2) 93 3) 73 4) 131 5) 114 6) 1244 7) 1528 8) 1429
- 9) 2084 10) 2002 11) 1999 12) 1098 13) 813 14) 1102 15) 1001

ASSIGNMENT 11

- 1) 16 2) 17 3) 30 4) 353 5) 267 6) 233 7) 2,137 8) 1,920 9) 1,857
- 10) 686 11) 22,982 12) 12,395 13) 12,783 14) 83,623 15) 14,532
- 16) 81,546 17) 104,013 18) 146,676 19) 87,928 20) \$42.19 21) \$1.76
- 22) \$13.01 23) \$16.80 24) \$167.52 25) \$441.45 26) \$5,155 27) \$21,308
- 28) \$652.74 29) \$13,108.20 30) \$8,409.08 31) 184 32) 1,175 33) 344
- 34) 4,551 35) 53,130 36) \$105.63 37) \$726.38 38) \$18.39 39) \$29.45

40)

6	1				1	8
2	2	1		1	4	4
	7	7		9	2	
		2	0	5		

ASSIGNMENT 11A

- 1) 38,900 2) (a) \$3.70 (b) \$5.68 (c) \$5.68 (d) \$5.78 (e) \$2.74
 (f) \$4.48 3) \$57.94 ; 12 lb. 13 oz. 4) 305 5) 2,345 lb.
 6) \$7.82 7) \$7.94; \$7.05; \$13.02 8) \$143.23 9) \$127.71
 10) 81,214 11) 935,317 12) 190,282 13) 28,286 14) 204,447
 15) 308,496 16) 8,771 17) Wilson, 729; Kawolics, 726; Fazio, 669;
 Jouglaard, 642; Nagy, 679 18) 43,603 19) 588,074 20) (b) 565 (c) 635
 (d) 330 (e) 500 (f) 390 (g) 645 (h) 860 21) 961,505 22) 393
 23) 62,282

EXERCISES

1)

8	3	4	15
1	5	9	15
6	7	2	15
15	15	15	15

3	10	5	18
8	6	4	18
7	2	9	18
18	18	18	18

4	18	8	30
14	10	6	30
12	2	16	30
30	30	30	30

2)

5	1		9	2		8	2
9	0		1	7	3		9
	9	1			1	2	9
9		1	7	7		7	9
1	4	6		6	3		
	4				1	4	2
8		1	0	1		4	0
1	0	0		1	0	3	0

ASSIGNMENT 12

- 1) 32 2) 21 3) 13 4) 32 5) 34 6) 55 7) 121 8) 132
9) 331 10) 612 11) 334 12) 551 13) 524 14) 534 15) 842
16) 121 17) 122 18) 426 19) 241 20) 4,321 21) 4,211
22) 4,321 23) 22,121 24) 35,222 25) 22,221 26) 11,333
27) 62,614 28) 42,231 29) (a) 45, 22, 63, 74; 37, 14, 55, 66; 54, 31, 72, 83; 26, 3, 44, 55 (b) 34, 11, 52, 63; 55, 32, 73, 84; 27, 4, 45, 56; 46, 23, 64, 75

- 30) 33 31) 263

ASSIGNMENT 13

- 1) 11 2) 4421 lb. 3) 111 4) 13 in. 5) 231
6) 135 7) 154 ml. 8) 35 9) 1,223

ASSIGNMENT 14

- 1) \$.72 2) \$1.22 3) \$.73 4) \$3.44 5) \$4.61 6) \$.44 7) \$1.32
8) \$6.54 9) \$112.21 10) \$336.30 11) 50 12) 39 13) 204 14) 4
15) 2 16) 30 17) 20 18) 19 19) 60 20) 100 21) 30 22) 40
23) 70 24) 304 25) 306 26) 100 27) 113 28) 102 29) 400
30) 240 31) 300 32) 330 33) 201 34) 80 35) 13 36) 703
37) 840 38) 107 39) 30 40) 7 41) 118 42) 540 43) 408
44) \$.47 45) \$.03 46) \$1.70 47) \$2.07 48) \$6.00 49) \$3.20
50) \$100.03

ASSIGNMENT 15

- 2) 49 3) 55 5) 362 6) 593

ASSIGNMENT 16

- 1) 33 2) 79 3) 225 4) 439 5) 4,108 6) 119 7) 91 8) 92 9) 370
10) 90 11) 836 12) 584 13) 76 14) 54 15) 6,209 16) 6,045
17) 4,125 18) 2,133 19) 2,146 20) 6,082 21) (a) 176 (b) 574 (c) 272

(d) 472

22) (a) 1,817 (b) 3,438 (c) 6,419 (d) 7,433 (e) 2,029 (f) 9,282

ASSIGNMENT 17

1) 488 2) 199 3) 99 4) 99 5) 89 6) 199 7) 354 8) 763 9) 559
10) 232 11) 259 12) 2,489 13) 6,385 14) 26,349 15) 29,189
16) 5,821 17) 4,831 18) 6,650 19) 3,533 20) 5,832 21) 3,681
22) 6,752 23) 2,781 24) 2,692 25) 1,991 26) 1,889 27) 5,956
28) 5,789 29) 2,889 30) 1,889 31) 4,636 32) 1,639 33) 719
34) 3,331 35) 3,188 36) 28,448 37) 19,486 38) 36,044 39) 77,089
40) 3,719 41) 9,071 42) 11,383 43) 23,169 44) 12,692 45) 91,786
46) (a) 691 (b) 3,779 (c) 9,584 (d) 27,157 (e) 93,147 (f) 52,886

ASSIGNMENT 18

1) 32 2) 26 3) 51 4) 27 5) 4 6) 9 7) 83 8) 47 9) 12 10) 28
11) 235 12) 523 13) 507 14) 485 15) 507 16) 201 17) 288 18) 436
19) 171 20) 231 21) 203 22) 304 23) 201 (24) 341 25) 462 26) 31
27) 142 28) 466 29) 110 30) 180 31) 250 32) 50 33) 130 34) 473
35) 176 36) 229 37) 418 38) 545 39) 768 40) 606 41) 62 42) 116
43) 245 44) 454 45) 324 46) 106 47) 551 48) 91 49) 793 50) 299
51) 358 52) 149 53) 119 54) 2,736 55) 5,539 56) 1,188 57) 4,654
58) 1,261 59) 2,603 60) 6,387 61) 328 62) 4,618 63) 346
64) 30,207 65) 44,108 66) (a) 546 (b) 886 (c) 888 (d) 189 (e) 2,823
(f) 7,823 (g) 2,084 (h) 2,452 67) (a) 646 (b) 7,717 (c) 491 (d) 2,987
68) (a) 284 (b) 229 (c) 476 (d) 2,143 (e) 2,789 (f) 2,975 (g) 2,081
(h) 3,647 (i) 1,848 (j) 1,273

69)

4	4		4	5		7	7
5	2		7	3		6	8
	7	5			4	9	
5		1	9	5	1		8
9	9		1	8		2	9
	4	9			1	5	
3	0		7	9		1	6
4	4		8	6		7	7

ASSIGNMENT 19

- 1) \$1.19 2) \$1.92 3) \$5.31 4) \$1.92 5) \$2.86 6) \$.09 7) \$4.88
 8) \$.69 9) \$.54 10) \$6.51 11) \$2.41 12) \$7.37 13) \$10.83 14) \$.81
 15) \$.90 16) \$8.00 17) \$19.13 18) \$2.19 19) \$4.75 20) \$20.27
 21) \$19.90 22) \$.35 23) \$3.37 24) \$1.25 25) \$4.57 26) \$6.09
 27) \$1.64 28) \$2.81 29) \$.10 30) \$5.98 31) \$5.55 32) \$3.56 33) \$2.96
 34) \$70.65 35) \$41.18 36) \$90.93 37) \$2.04 38) \$2.97 39) \$1.94
 40) \$6.99 41) \$.75 42) \$63.50 43) \$5.54 44) \$586.88 45) \$227.69
 46) \$586.88 47) \$167.47 48) \$556.81 49) \$373.00 50) (a) \$7.02
 (b) \$89.75 (c) \$1.50 (d) \$21.57 (e) \$546.19 (f) \$162.38

ASSIGNMENT 20

- 1) 19 2) 48¢ 3) 89 4) \$16.02 5) \$3.02 6) 1168 mi. 7) 165 mi.;
 474 mi.; 491 mi.; 118 mi.; San Francisco and New York; New York and Chicago
 8) \$1.25 9) 66, 57, 48, 39, 30, 21, 12, 3 10) 9 11) 18 yr. 12) \$2.95
 13) \$15.69 14) 42¢ 15) 56¢ 16) \$59.75 17) 16 18) 5,602 19) 319,061
 sq. mi. 20) \$1,640 21) 77,725 22) \$7,615 23) \$7.85 24) \$265.35
 26) \$10.11 27) (a) 645 ft. (b) 24 ft. (c) 445 ft. (d) 649 ft.
 28) (a) 8 (b) 18 (c) 22 (d) 15 (e) 18 29) (a) 154 mi. (b) 1,234 mi.
 (c) \$15.71 (d) \$32.84 (e) \$18.67 (f) \$13.64 (g) \$50.80

ASSIGNMENT 21

- 1) 806 2) 298 3) 1,001 4) 179 5) 4,103 6) 5,889 7) 5,142
 8) 24,195 9) 1,025 10) \$9.31 11) \$.69 12) \$4.35 13) 706 14) 460
 15) 2,626 16) 455 17) 20 18) \$6.65 19) 987 20) 367 21) \$42.34
 22) 4,123 23) 2,306 24) 1,326 25) 2,478 26) 4,758 27) 24,984
 28) \$8.56 29) 25,687 30) \$80.57 31) \$20.07 32) 7,226 33) 4,980
 34) 20,427 35) 37,508 36) \$11.40 37) \$7.43; \$4.07 38) 53 39) \$1.25
 40) \$55.00 41) \$59.75 42) \$80.11 43) 11 min. 44) 1,284 45) 775
 46) 317 47) \$.32

ASSIGNMENT 22

- 1) (A) 7, 1, 3 (B) 2, 8, 1 (C) 4, 9, 6

2)

10	24	14
20	16	12
18	8	22

3)

2	3	3	0		9	1
8	8	9		8	3	5
2	6		2	9	1	1
		2	3	1		
9	8	7	8		4	5
6	2	0		3	2	3
9	4		1	5	0	5

ASSIGNMENT 23

- 1) Multiply 2) Multiply 3) Add 4) Add 5) Multiply 6) Multiply

- 7) Multiply 8) (a) 4 (b) 6 (c) 9 (d) 11 (e) 10 (f) 14

$$\begin{array}{r} 3 \\ 5 \\ +9 \\ \hline \end{array}$$

$$\begin{array}{r} 6 \\ 6 \\ +2 \\ \hline \end{array}$$

$$\begin{array}{r} 9 \\ \times 5 \\ \hline \end{array}$$

$$\begin{array}{r} 11 \\ \times 4 \\ \hline \end{array}$$

$$\begin{array}{r} 10 \\ 9 \\ 9 \\ 9 \\ +9 \\ \hline \end{array}$$

$$\begin{array}{r} 14 \\ \times 5 \\ \hline \end{array}$$

9) (b) $\begin{array}{r} 3 \\ +3 \\ \hline \end{array}$ $\begin{array}{r} 3 \\ \times 2 \\ \hline \end{array}$ (c) $\begin{array}{r} 4 \\ +4 \\ \hline \end{array}$ $\begin{array}{r} 4 \\ \times 3 \\ \hline \end{array}$ (d) $\begin{array}{r} 2 \\ +2 \\ \hline \end{array}$ $\begin{array}{r} 2 \\ \times 5 \\ \hline \end{array}$

10) (a) $\begin{array}{r} 9 \\ 9 \\ 9 \\ 9 \\ 9 \\ +9 \\ \hline \end{array}$ (b) $\begin{array}{r} 8 \\ 8 \\ 8 \\ 8 \\ 8 \\ +8 \\ \hline \end{array}$ (c) $\begin{array}{r} 7 \\ 7 \\ 7 \\ 7 \\ 7 \\ +7 \\ \hline \end{array}$ (d) $\begin{array}{r} 11 \\ 11 \\ 11 \\ 11 \\ 11 \\ +11 \\ \hline \end{array}$

11) $\begin{array}{r} 9 \\ \times 4 \\ \hline \end{array}$ $\begin{array}{r} 7 \\ \times 3 \\ \hline \end{array}$ $\begin{array}{r} 6 \\ \times 6 \\ \hline \end{array}$ $\begin{array}{r} 11 \\ \times 5 \\ \hline \end{array}$ $\begin{array}{r} 18 \\ \times 7 \\ \hline \end{array}$

ASSIGNMENT 24

1) 1 2 3 4 5 6 7 8 9

1	1	2	3	4	5	6	7	8	9
2	2	4	6	8	10	12	14	16	18
3	3	6	9	12	15	18	21	24	27
4	4	8	12	16	20	24	28	32	36
5	5	10	15	20	25	30	35	40	45
6	6	12	18	24	30	36	42	48	54
7	7	14	21	28	35	42	49	56	63
8	8	16	24	32	40	48	56	64	72
9	9	18	27	36	45	54	63	72	81

2) (a) 4 (b) 4 (c) 4 (d) 2

3)

	4	1	9	7	6	3	8	2	5
8	32	8	72	56	48	24	64	16	40
3	12	3	27	21	18	9	24	6	15
1	4	1	9	7	6	3	8	2	5
5	20	5	45	35	30	15	40	10	25
9	36	9	81	63	54	27	72	18	45
2	8	2	18	14	12	6	16	4	10
4	16	4	36	28	24	12	32	8	20
7	28	7	63	49	42	21	56	14	35
6	24	6	54	42	36	18	48	12	30

4)

3	3		8
7	8		
		5	7
7		3	5
1	5		

ASSIGNMENT 25

- 1) 82 2) 96 3) 77 4) 48 5) 28 6) 66 7) 63 8) 128 9) 36
 10) 168 11) 279 12) 244 13) 186 14) 189 15) 248 16) 279 17) 249
 18) 148 19) 147 20) 159 21) 288 22) 166 23) 628 24) 669 25) 4,266

- 26) 699 27) 3,688 28) 1,236 29) 4,682 30) 9,669 31) 14,248
 32) 72,999 33) 28,488 34) 12,969 35) 10,244 36) 69,936 37) 168,844
 38) 66,842 39) 63,636 40) 168,448

ASSIGNMENT 26

- 1) $3 \times 0 = 0$ 2) $5 \times 0 = 0$ 3) $7 \times 0 = 0$ 4) $2 \times 0 = 0$ 5) $0 + 0 + 0 = 0$
 6) $0 + 0 + 0 + 0 + 0 + 0 + 0 = 0$ 7) $0 + 0 + 0 + 0 + 0 = 0$
 8) (a) 0 (b) 0 9) 0 10) 0 11) 0 12) 0 13) 0 14) 90 15) 90
 16) 120 17) 360 18) 320 19) 490 20) 180 21) 1,098 22) 2,107
 23) 2,709 24) 6,309 25) 3,208 26) 930 27) 3,680 28) 1,260
 29) 7,290 30) 1,480 31) 3,600 32) 4,800 33) 600 34) 5,400
 35) 2,100 36) 500 37) (a) Jim, 12; George, 9; Charlie, 3; Michael, 4;
 Kevin, 0 (b) Jim (c) Kevin (d) He made all his points by free throws
 (e) Yes

ASSIGNMENT 27

- 2) \$.12 3) \$.46 4) \$.03 5) \$.09 6) \$.91 7) \$.99 8) \$.58 9) \$.07
 10) 2 quarters 11) 7 nickels 12) 6 dimes and 4 nickels 13) \$.55
 14) \$.96 15) \$.88 16) \$.24 17) \$2.46 18) \$1.88 19) \$2.19 20) \$3.64
 21) \$.48 22) \$.99 23) \$1.40 24) \$1.80 25) \$7.20 26) \$2.40
 27) \$15.39 28) \$24.48 29) \$21.69 30) \$24.48 31) \$12.08 32) \$12.06
 33) \$36.60 34) \$36.80 35) \$39.90 36) \$9.06 37) \$48.60 38) \$884.48
 39) \$1,236.99 40) \$1,833.39 41) \$1,424.86 42) \$7,963.39 43) \$60.69
 44) \$160.08 45) \$800.24 46) \$8,400.08 47) \$50.05 48) \$1,470.07
 49) \$468.46 50) \$448.48

ASSIGNMENT 28

- 1) 48 yr. 2) 1,266 mi. 3) 189 4) 99 5) 1,200 6) 21 7) 12,488 lb.
 8) \$80.80 9) 360 lb. 10) 88

ASSIGNMENT 29

- 1) 32 2) 65 3) 168 4) 68 5) \$.38 6) \$2.10 7) \$4.45 8) \$.48
9) \$.92 10) 192 11) 343 12) \$3.18 13) 768 14) 190 15) \$2.64
16) \$1.62 17) 632 18) 476 19) 324 20) 864 21) \$1.96 22) \$2.96
23) 798 24) 464 25) 278 26) \$6.75 27) \$15.54 28) \$6.81 29) \$9.18
30) 824 31) 1,221 32) 1,816 33) 4,942 34) 1,463 35) 5,454
36) 5,649 37) 1,836 38) 2,440 39) 4,224 40) 1,540

ASSIGNMENT 30

- 1) 3,444 2) 3,164 3) 4,608 4) 2,868 5) 3,944 6) 3,222 7) 3,845
8) 7,864 9) \$2,548 10) \$3,834 11) \$1,840 12) \$8.01 13) \$76.96
14) \$49.91 15) 14,064 16) 39,210 17) 73,107 18) 10,252 19) 45,240
20) 20,946 21) 12,448 22) \$70.38 23) \$274.98 24) \$540.72 25) 1,872
26) 4,963 27) 12,300 28) 30,594 29) \$210.56 30) \$303.66
31) \$1,069.08 32) \$3,802.33 33) \$6,429.20 34) \$4,504.45 35) \$5607.12
36) \$1,473.01 37) \$57,600.63

ASSIGNMENT 31

- 1) 50 2) 70 3) 20 4) 140 5) 270 6) 380 7) 560 8) 920 9) 860
10) 120 11) 150 12) 120 13) 100 14) 280 15) 240 16) 120
17) 120 18) 350

ASSIGNMENT 32

- 1) 299 2) 748 3) 516 4) 704 5) 504 6) 408 7) 1,066 8) 1,148
9) 6,552 10) 5,986 11) 3,036 12) 2,173 13) 1,036 14) 4,704
15) 2,109 16) 8,330 17) 3,783 18) 1,566 19) 2,065 20) 4,307
21) 1,972 22) 1,794 23) 1,150 24) 2,320 25) 2,160 26) \$30.10
27) \$25.60 28) \$24.50 29) 6,480 30) \$83.70 31) \$22.56 32) \$27.30
33) \$81.88 34) 5,494 35) 4,582 36) 2, 241 37) 6,298 38) 3,658
39) 8,099 40) 1,026 41) 3,094 42) 1,840 43) 2,394 44) 1,430
45) 448 46) 522 47) 2,223 48) 8,514 49) 2,773 50) 6,889

ASSIGNMENT 33

- 1) \$20.85 2) 3,225 3)(a) \$1.72 (b) \$28.50 (c) \$107.25 (d) \$9.00
 4) 1,500 5) 312 mi. 6) \$7.35 7) 992 mi. 8) \$118.32 9) \$12.05
 10) 220 11) 792 12) \$3.92 13) \$138.72 14) (a) \$55.84 (b) \$23.40
 (c) \$149.25 15) (a) \$941.40 (b) \$18,828 16) \$90 17) \$78.75 18) \$180
 19) \$425 20) 1,008 21) 4,032 22) \$46.50 23) \$2160 24) 1,400
 25) \$3975.75 26) 35,190 27) 28,200 28) \$717 29) 5,760 mi. 30) 384
 31) 120 32) (a) 635 (b) 33,020 33) 8,556

ASSIGNMENT 34

- 1) Two hundred forty-six thousand, eight hundred ninety-two
 Eight hundred sixty-three thousand, four hundred twenty-nine
 Nine hundred sixty-eight thousand, six hundred thirty-nine
 Two million, seven hundred forty-two thousand, eight hundred ninety-six
 Three million, five hundred eighty-four thousand, nine hundred two
 Six hundred thousand, fifty-eight
 Eight million, seventy thousand, six

2)

Millions' Group			Thousands' Group			Ones' Group		
hundreds	tens	ones	hundreds	tens	ones	hundreds	tens	ones
a			5	6	8	3	4	2
b				9	8	5	8	3
c		3	8	5	6	9	5	2
d		9	6	4	3	7	7	7
e			5	0	3	9	0	7
f			8	0	0	0	7	3
g		5	0	7	7	0	0	9
h		3	9	0	0	9	0	0
i			4	0	8	0	0	9
j		1	6	4	0	7	0	0

- 3) (a) 372,854 (d) 8,900,005 (g) \$63,892.02 (j) \$3,000,000
 (b) 9,863,874 (e) 6,000,006 (h) \$20,076.02 (k) \$9,000,000
 (c) 634,902 (f) \$2,743.58 (i) \$690,374.98 (l) \$8,000,000.08

- 4) (a) 13; 103; 130; 133 (b) 607; 670; 706; 760
 (c) 2,345; 3,245; 4,325; 4,532
 (d) 48,962; 49,269; 84,296; 94,682
 (e) 100,011; 100,101; 101,001; 110,010
 (f) 3,000,101; 3,010,001; 3,100,100; 3,110,000
 5) 791,612 6) 688,906 7) 2,939,478 8) 9,333,778 9) 4,761,833
 10) (a) 17,404,450 (b) 4,270,995 (c) 222,037 (d) Yes

ASSIGNMENT 35

- 1) 50,025 2) 608,937 3) 227,592 4) 40,141 5) 178,718 6) \$3,395.52
 7) \$3,684.56 8) \$4,544.28 9) \$5,498.26 10) \$8,512.94 11) 16,900
 12) \$344.50 13) 68,886 14) 5,147,383 15) \$330,000,000

ASSIGNMENT 36

- 1) 7,942 2) 4,644 3) 14,674 4) 41,006 5) 1,080 6) 4,320 7) 204,120
 8) 257,020 9) 772,326 10) 355,776 11) \$5,681.10 12) \$2,606.52
 13) \$1722.87 14) \$4,904.56 15) 450,100 16) 394,800 17) 215,100
 18) \$3,900 19) \$4,784 20) \$6300

ASSIGNMENT 37

- 1) (a) 4,636 (b) 4,387 (c) 7,568 (d) 12,790 2) (a) 1,027 (b) 2,240
 (c) 2,541 (d) 6,538 3) (a) 8,172 (b) 23,076 (c) 4,856,778
 4) \$17.22 5) \$1.52 6) \$.25 7) 4,053 8) \$63.32 9) 20,196 10) 6,110
 11) \$63.63 12) 260,489 13) 29,708 14) 20,882 15) 11,266 16) 80,199
 17) 105,565 18) \$840.83 19) \$131.90 20) 3,416 21) 67,452 22) \$26.70
 23) 160,065 24) 2,841,823 25) 2,169,386 26) \$397.06 27) 21
 28) 2,424,448 29) 14,532 30) 104,013 31) 189,739 32) \$674.33
 33) 21,180 34) 378,000 35) \$1,913.84 36) 9,947 37) 16,722 38) 124,680
 39) \$2,245.78 40) 8,818 41) \$3,391.33 42) 242,123 43) \$4,050.20
 44) 468,981 45) \$1,980.44 46) 9,992,885 47) 560,000 48) 8,263,849
 49) \$5,850 50) 4,356,028 51) (a) S (b) A (c) M 52) \$11.37 53) \$.67
 54) \$10.95 55) 262 56) \$198 57) 5,012 58) 2,017 59) \$9.62 60) \$1.00

- 61) \$.07 62) \$2.77 63) \$5.83 64) \$4.17 65) 5,821 mi. 66) \$305
 67) \$117.75 68) \$357.25 69) \$23.47 70) (a) \$30.50 (b) \$16.62 (c) \$3.55
 (d) \$24.10 (e) \$14.51 (71) \$134.50 72) \$5.20 73) \$.77
 74) 6,210 ft. 75) \$23.85 76) Yes 77) \$1.79 78) 3,000 mi. 79) \$302.40
 80) 89,760 81) \$33,750 82) \$113.75 83) 2,899 ft. 84) \$7.30
 85) \$461.56 86) (a) Multiplication (b) Multiplication (c) Addition
 (d) Subtraction 87) (a) \$.26 (b) \$1.30 (c) \$52 88) 48 89) 2,401
 90) 720 91) 315 92) \$1.00 93) \$24.07 94) \$1.55

ASSIGNMENT 38

2	8		8	6	1		5
3	1	9	0		2	5	0
7		8	4	9	0		4
	9	0		1	9	5	
2	5		2	0		2	1
1	0	9	2		7	1	4
2		1	2	1		6	1
4	2	0		3	9	5	9

ASSIGNMENT 39

- 1) Number of small groups 2) Number in each small group
 3) Number of small groups 4) Number of small groups
 5) Number of small groups 6) Number in each small group
 7) Number in each small group 8) Number in each small group

ASSIGNMENT 40

- 1) (a) 3 (b) 3 (c) 2 (d) 3 (e) 8 (f) 9
 2) (a) 6 (b) 8 (c) 1 (d) 2 (e) 3 (f) 4
 3) (a) 1 (b) 2 (c) 2 (d) 1 (e) 3 (f) 4

ASSIGNMENT 40 (Cont.)

- 4) (a) 5 (b) 4 (c) 4 (d) 4 (e) 2 (f) 3
5) (a) 4 (b) 1 (c) 2 (d) 4 (e) 1 (f) 5
6) (a) 5 (b) 6 (c) 5 (d) 6 (e) 8 (f) 9
7) (a) 7 (b) 8 (c) 6 (d) 8 (e) 7 (f) 9
8) (a) 9 (b) 6 (c) 5 (d) 5 (e) 7 (f) 7
9) (a) 9 (b) 7 (c) 7 (d) 8 (e) 9 (f) 8
10) (a) 6 (b) 7 (c) 6 (d) 6 (e) 8 (f) 7

ASSIGNMENT 41

- 1) (a) 2 r4 (b) 4 r2 (c) 5 r2 (d) 3 r4 (e) 3 r3 (f) 3 r3
(g) 5 r4 (h) 3 r4
2) (a) 2 r1 (b) 2 r4 (c) 4 r3 (d) 2 r3 (e) 4 r3 (f) 3 r3
(g) 6 r7 (h) 8 r2
3) (a) 4 r2 (b) 4 r4 (c) 5 r1 (d) 5 r3 (e) 8 r1 (f) 9 r5
(g) 7 r7 (h) 3 r3
4) (a) 8 r3 (b) 7 r1 (c) 9 r4 (d) 8 r1 (e) 6 r3 (f) 3 r1
(g) 9 r3 (h) 6 r4
5) (a) 3 (b) 2 r2 (c) 3 r2 (d) 5 r1 (e) 5 r1 (f) 5 r2
(g) 4 r5 (h) 2 r6
6) (a) 3 r4 (b) 7 r1 (c) 9 r2 (d) 4 r3 (e) 6 r1 (f) 8 r1
(g) 9 r4 (h) 6 r5
7) (a) 4 r4 (b) 5 r5 (c) 8 r5 (d) 9 r3 (e) 3 r2 (f) 8 r3
(g) 6 r4 (h) 6 r7
8) (a) 9 r3 (b) 6 r4 (c) 8 r8 (d) 3 r7 (e) 9 r4 (f) 9 r6
(g) 6 r1 (h) 6 r3

ASSIGNMENT 42

- 1) 29 2) 23 3) 14 4) 78 5) 99 6) 46 7) 39 8) 63 9) 33
10) 39 11) 71 r4 12) 58 13) 25 r2 14) 96 r1 15) 79 16) 48 r2

ASSIGNMENT 42 (Cont.)

- 17) 352 r5 18) 33 r4 19) 62 r2 20) 789 21) 66 r1 22) 788 r1
23) 594 r1 24) 586 r3 25) 582 r3 26) 35 r2 27) 64 r2 28) 62 29) 67
30) 854 r6 31) 82 r5 32) 47 33) 26 34) 26 r7 35) 239 r2 36) 23 r2
37) 77 r8 38) 31 r1 39) 71 r1 40) 42 r2 41) 81 r2 42) 51 r3
43) 485 44) 365 45) 362 r3 46) 448 r5 47) 469 r1 48) 38 r3
49) 797 r1 50) 871 r6

ASSIGNMENT 43

- 1) 30 2) 20 3) 302 4) 200 5) 330 6) 10 r3 7) 10 r1 8) 10 r3
9) 20 r2 10) 30 r1 11) 50 r6 12) 30 r3 13) 20 r8 14) 60 r4
15) 40 r5 16) 109 17) 105 18) 207 19) 108 20) 308 21) 203 r1
22) 106 r4 23) 109 r3 24) 205 r2 25) 420 r5 26) 870 r2 27) 820 r3
28) 203 r6 29) 420 r3 30) 260 r2 31) 540 r3 32) 904 r3 33) 410 r2
34) 310 r4 35) 1680 r5 36) 330 r3

ASSIGNMENT 44

- 1) 4; 7 2) 80 3) 30 4) 21 5) 18 6) 31 7) 40 8) 118 9) 2,640
10) 555 11) 398 12) 1,248 13) 6 14) 14 15) 7; 14 16) 475 mi.
17) 13

ASSIGNMENT 45

- 1) 4 2) 7 3) 9 4) 8 5) 6 6) 3 7) 2 8) 1 9) 5 10) 1 r9
11) 6 r8 12) 5 r2 13) 1 r8 14) 8 r9 15) 5 r7 16) 2 r8 17) 6 r5
18) 4 r5 19) 9 r4 20) 9 r9 21) 2 22) 1 23) 3 24) 2 25) 2
26) 4 27) 1 28) 1 29) 8 30) 8 31) 9 32) 5 33) 4 r10 34) 4
35) 4 36) 5 37) 6 38) 2 r22 39) 7 r10 40) 3 r8 41) 2 r15
42) 8 r11 43) 4 r23 44) 6 r4 45) 6 r13 46) 5 r7 47) 3 r16
48) 6 r10 49) 6 r16 50) 6 r17

ASSIGNMENT 46

- 1) 2 2) 3 3) 2 4) 3 5) 2 6) 2 7) 2 8) 3 9) 2 10) 3 11) 3
12) 6 13) 6 14) 3 15) 2 16) 6 17) 6 18) 5 19) 3 20) 2 21) 4
22) 7 23) 4 24) 3 25) 3 26) 4 27) 2 28) 9 29) 4 30) 3
31) 1 r23 32) 2 r9 33) 3 r12 34) 4 r1 35) 2 r5 36) 3 r3 37) 2 r12
38) 4 r21 39) 5 r13 40) 3 r10 41) 3 r11 42) 4 r1 43) 4 r5 44) 8 r4
45) 7 r2 46) 5 r14 47) 7 r3 48) 9 r11 49) 9 r3 50) 8 r30

ASSIGNMENT 47

- 1) (A) 1 (B) 2 (C) 2 (D) 2 (E) 3 (F) 1 (G) 2 (H) 3 (I) 2
(J) 2 (K) 3 (L) 2
2) (A) $\sqrt[3]{434}$ (B) $\sqrt[3]{2552}$ (C) $\sqrt[3]{1386}$ (D) $\sqrt[3]{837}$ (E) $\sqrt[3]{7038}$ (F) $\sqrt[3]{80}$
(G) $\sqrt[3]{445}$ (H) $\sqrt[3]{7294}$ (I) $\sqrt[3]{1071}$ (J) $\sqrt[3]{1280}$ (K) $\sqrt[3]{9465}$ (L) $\sqrt[3]{392}$
3) 12 4) 24 5) 13 6) 14 7) 24 8) 34 9) 12 10) 13 11) 12
12) 13 13) 13 14) 14 15) 41 16) 15 17) 14 18) 24 19) 22 20) 14
21) 22 22) 23 23) 23 24) 33 25) 23 26) 31 27) 23 28) 12 29) 14
30) 22 31) 523 32) 323 33) 141 34) 161 35) 412 36) 334 37) 22 r20
38) 23 r4 39) 11 r5 40) 11 r9 41) 73 r6 42) 31 r4 43) 22 r12
44) 15 r18 45) 22 r12 46) 11 r16 47) 22 r24 48) 12 r11 49) 21 r8
50) 52 r8 51) 26 r7 52) 24 r20 53) 11 r14 54) 41 55) 22 r20
56) 912 r12 57) 243 r46 58) 134 r14 59) 130 r40 60) 323 61) 523
62) 115 r41 63) 917 r20 64) 378 r2 65) 417 66) 167 r2

ASSIGNMENT 48

- 1) 5 r27 2) 4 r70 3) 3 r75 4) 6 r72 5) 4 r25 6) 5 r70 7) 4 r50
8) 2 r36 9) 7 r16 10) 2 r27 11) 5 r12 12) 8 r50 13) 5 r32
14) 4 r68 15) 7 r56 16) 2 r21 17) 6 r16 18) 6 r33 19) 57 r13
20) 67 r15 21) 6 r22 22) 67 r1 23) 6 r32 24) 77 r30 25) 7 r26 26) 6
27) 78 28) 67 29) 8 r9 30) 9 r51 31) 99 r78 32) 97 r51 33) 9 r51
34) 9 r45 35) 9 r81 36) 9 r41 37) 94 38) 95 39) 99 r32 40) 98 r52

ASSIGNMENT 48 (Cont.)

- 41) 99 r80 42) 97 r13 43) 96 r3 44) 6 r25 45) 4 r34 46) 4 r42
47) 32 r38 48) 9 r2 49) 44 r11 50) 88 r8

ASSIGNMENT 49

- 1) 20 2) 50 3) 70 4) 80 5) 50 6) 70 7) 60 8) 40 9) 50 10) 20
11) 50 r40 12) 30 r10 13) 30 r7 14) 20 r10 15) 30 r9 16) 5 r10
17) 230 18) 460 19) 310 20) 770 21) 690 r23 22) 580 r62
23) 680 r21 24) 390 r23 25) 740 r46 26) 510 r21 27) 280 r61
28) 790 r26 29) 490 r56 30) 203 31) 908 32) 201 33) 302 34) 205
35) 205 36) 304 37) 307 r14 38) 206 r1 39) 304 r1 40) 507 r47
41) 405 r5 42) 506 r58 43) 900 44) 400 45) 600 46) 400 r21
47) 700 r36 48) 300 r32 49) 305 r22 50) 407 r47

ASSIGNMENT 50

- 1) \$2.12 2) \$1.10 3) \$1.02 4) \$.21 5) \$.74 6) \$2.55 7) \$.55
8) \$.23 9) \$.19 r40¢ 10) \$.31 r55¢ 11) 21 12) 21 13) 72 14) 42
15) \$1.33 16) \$2.03 17) \$6.90 r25¢ 18) \$4.07 r6¢ 19) \$5.07 r45¢
20) \$4.17 21) \$1.45 22) \$3.14 r4¢ 23) 57 r12 24) 38 r43 25) 48 r20
26) \$4.20 r21¢ 27) 1077 r2 28) \$3 r46¢

ASSIGNMENT 51

- 1) \$709 2) \$.23 3) 7¢ 4) \$.70 5) 205 6) 3 7) \$.12 8) 13
9) \$65 10) \$1.23 11) \$1.08 12) \$.23 13) \$156 14) 24 15) \$.35
16) 56 17) 9 18) 8 19) \$9.10 20) \$89.45 21) 13; 10 22) 33
23) \$.16 24) 29 25) \$60. 26) \$155 27) 702 28) 215 29) \$10.79
30) \$6.50 31) 43; 3 32) 50 33) 33 34) 103 hr. 35) 21 36) \$1.75
37) \$.65 38) \$.35 39) 7 hr.

ASSIGNMENT 52

- 1) 48 2) (a) 220 (b) 4 (c) 11 3) 308 mi. 4) 109 5) 31 6) 109 lb.
7) 9,760 lb. 8) 85 9) 37 10) \$.70 11) \$3 12) 11,892 13) \$4.24

ASSIGNMENT 52(Cont.)

14) \$2.55 15) 42 hr. 16) 45

(Cont.) 23 TANNING

ASSIGNMENT 53

- 1) 2,200 2) 3,269 3) 4,416 4) 64 r53 5) 10,299 6) 29,708 7) 2,173
8) 146,160 9) 791 r6 10) 879 r3 11) 206 r7 12) 33,768,520
13) \$39,042 14) \$59.87 15) \$11.46 16) 2,628 17) \$174.18 18) 700 r10
19) 105,565 20) 80,199 21) \$4,424.82 22) \$3,559.20 23) \$2,354.58
24) \$4,630 25) 250,857 26) 300,755 27) \$47.04 28) 155,976
29) 511,200 30) 616 31) 374 32) 456 r55 33) 101 r28 34) \$33.68
35) 13,238 36) \$878.90 37) \$261.25 38) 370,392 39) 207 40) 270 r12
41) \$.75 42) 99 43) 202,800 44) \$567.41 45) \$881.03 46) 480,212
47) 216,300 48) (A) IX (B) XII (C) VI (D) I (E) X (F) III
49) (A) 12 (B) 7 (C) 20 (D) 1,000 (E) 9 (F) 4 50) (A) 4,006,060
(B) 9,000,008,000 (C) 200,000,000

ASSIGNMENT 54

- 1) \$4.65 2) 600 3) \$59 4) 5,755 mi. 5) (a) 240 lb. (b) 20 lb. 6) 720
7) \$8.51 8) (a) Mercury (b) Mars (c) Mercury (d) Mars 9) \$4.50
10) \$385.25 11) \$11.52 12) \$15 13) 21 hr. 14) 229 mph. 15) 600

ASSIGNMENT 55

1) 3; 2

2)

12	40	20
32	24	16
28	8	36

ASSIGNMENT 55 (Cont.)

3)

5	7	9		9	4	2
4	6	2		1	4	3
		9	0		1	7
9	6	6		2	7	8
5	7		1	8		
8	1	9		9	4	9
2	0	6		2	2	8